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September 27, 2019

Chinny Esakkiperumal
Olin Corporation
3855 North Ocoee Street, Suite 200
Cleveland, TN 37312

Subject: Per- and Polyfluoroalkyl Substances (PFAS) Sampling Results
Olin Chemical Superfund Site, Wilmington, Massachusetts

Dear Mr. Esakkiperumal:

This letter report was prepared on behalf of Olin Corporation (Olin) by Wood Environment and Infrastructure Solutions Inc., (Wood) to summarize the findings of groundwater sampling in select wells for per- and polyfluoroalkyl substances (PFAS) at the Olin Chemical Superfund Site (Site) in Wilmington, Massachusetts. Sampling was conducted at the request of the United States Environmental Protection Agency (USEPA) to assess the potential presence of PFAS at the Site. Sampling was performed in accordance with the approved Remedial Investigation (RI) Work plan Addendum V, PFAS Sampling Plan dated May 23, 2019 (Wood, 2019). The sampled locations are shown on **Figure 1** and include:

- Six wells located in the vicinity of the four historical manufacturing areas,
- Two wells located downgradient in the northeast corner of the property
- One well located on the western side of the Containment Area
- Three multiport samples located within Dense Aqueous Phase Liquid (DAPL), diffuse and overlying groundwater in the Containment Area on-property DAPL pool, and
- One bedrock well located in the Containment Area.

Note, the approved sampling plan included the collection of groundwater PFAS samples from fourteen locations. However, one well, B-10, located in the middle of Plant B Production Area (**Figure 1**), could not be located and is presumed destroyed. B-10 is not part of routine monitoring activities and has not been sampled for over 8 years. Although B-10 could not be sampled, two other wells in the immediate vicinity and downgradient of B-10 (GW-16R; and GW-101) were sampled as part of this investigation – so absence of data from well B-10 does not present a data gap.



#### **GROUNDWATER SAMPLING**

On May 28 and 29, 2019, groundwater samples for PFAS analysis were collected using low-flow procedures outlined in the RI/Feasibility Study (FS) Work Plan. PFAS-specific sampling precautions as described in the PFAS Quality Assurance Project Plan (QAPP) Addendum were carried out throughout the sampling effort.

The depth to water was measured in each well prior to initiating sampling; because of the narrow diameter of the sampling ports, depth to water was not measured in multiport well MP-1. Field Data forms documenting the sampling at each well are provided in **Attachment A**. Decontamination of non-dedicated sampling and measuring devices was completed between sampling locations using PFAS-free water.

Samples were placed in a cooler, iced, and delivered using overnight courier to Eurofins Lancaster Laboratories Environmental for analysis of fourteen PFAS compounds using USEPA analytical method 537 Version 1.1 Modified.

#### **RESULTS**

A summary of the PFAS sampling results is provided in **Table 1.** Data validation was conducted in accordance with the QAPP. A subset of the data was qualified as estimated during validation; however, no data were rejected due to laboratory issues. A copy of the Data Validation Report is provided as **Attachment B** and laboratory data reports are provided in **Attachment C**.

None of the sampled locations had perfluorooctane sulfonate (PFOS) or perfluorooctanoic acid (PFOA) present at concentrations above the USEPA Health Advisory (HAs) and project action limits (PALs) outlined in the QAPP. Detected concentrations of PFOS and PFOA ranged from less than 1 nanograms per liter (ng/L) to a maximum of 8.4 ng/L. The HA for PFOS and PFOA is 70 ng/L (for individual compounds or combined where the compounds are detected in the same sample) and the PALs range from 40 to 4,000 ng/L. Overall, the detected concentrations were significantly less than the HAs and PALs. Note, one of the thirteen samples collected (OC-MP-1#1-XX) was analyzed by the laboratory at a reduced volume (with a dilution factor of 100X) due to matrix interference. PFAS compounds were not detected in this diluted analysis and the reporting limits were elevated accordingly. Olin instructed the laboratory to re-analyze the sample at a 25X dilution factor. PFAS compounds were not detected in the re-analysis performed on OC-MP-1#1-XX and the minimum detection levels reported by the laboratory were less than the PALs.

## **CONCLUSIONS & RECOMMENDATIONS**

As requested by the USEPA, groundwater samples were collected for PFAS analysis at locations down gradient from former manufacturing areas that have shown evidence of historical site-related activities/impacts. Samples were also collected from within the containment area, from both the diffuse layer and within the DAPL overlying bedrock. Wells that were sampled for PFAS are installed in different aquifers (shallow overburden, deep overburden and shallow bedrock) providing a vertical evaluation of the aquifers for PFAS. Detected PFOS and PFOA concentrations (either individual or combined) at the thirteen sampling locations were significantly below USEPA HAs and PALs. Analysis of groundwater samples collected as part of this investigation does not indicate a source for PFAS, or PFAS impacts at the site. Therefore, it is recommended that no further sampling for PFAS compounds be conducted or is warranted for the Site.



Sincerely,

**Wood Environment & Infrastructure Solutions, Inc.** 

Elizabeth T. Bowen

Associate Project Manager

Hank Andolsek

Senior Hydrogeologist

Copy: James Cashwell, Olin Corporation

Nelson Walter, Wood Environment and Infrastructure, Inc.

### **Attachments:**

Figure 1 - PFAS Sampling Locations

Table 1 - Final Results Summary

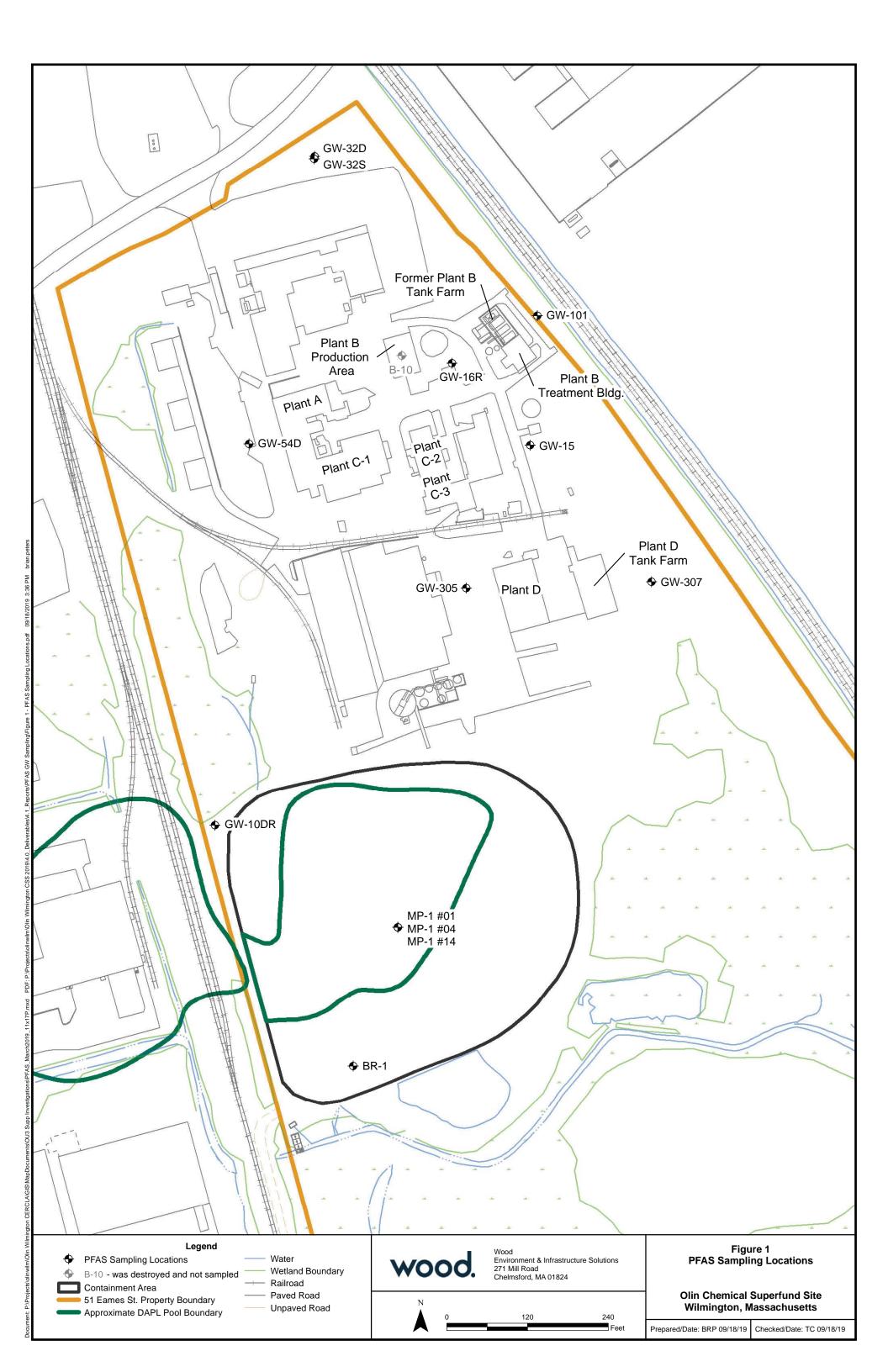
Attachment A - Field Data Records

Attachment B - Data Validation Report

Attachment C - Laboratory Analytical Report



## **FIGURE**





## **TABLE**

			very Group	2046067	2046067	2046067	2046067		
			Lab	Sample Deli	Location	BR-1	GW-101	GW-15	GW-16R
				Field C	ample Date	5/28/2019	5/28/2019	5/28/2019	5/28/2019
					•				
				Field	Sample ID				OC-GW-16R-XXX
					QC Code	FS	FS	FS	FS
Method	Fraction	Parameter	PALs	HAs	Units	Result Qualifier	Result Qualifier	Result Qualifier	Result Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	NA	NA	ng/l	2.7 U	2.5 U	2.7 U	2.6 U
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	NA	NA	ng/l	2.7 U	2.5 U	2.7 U	2.6 U
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	40000	NA	ng/l	<b>0.78</b> J	<b>0.76</b> J	0.99	0.83 J
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	NA	NA	ng/l	1.8 U	1.7 U	1.8 U	1.7 U
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	NA	NA	ng/l	1.8 U	1.7 U	1.8 U	1.7 U
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	70	NA	ng/l	2.1	2.3	<b>0.52</b> J	0.89
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	70	NA	ng/l	1.1 J	1.7 U	<b>0.44</b> J	1.7 U
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	70	NA	ng/l	3.4	5.3	<b>0.68</b> J	1.6 J
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	70	NA	ng/l	1.1 J	<b>1.3</b> J	1.8 U	<b>0.55</b> J
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	40	70	ng/l	6.4	5.1	3.5	2
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	40	70	ng/l	8.4	5.2	2.5	3.2
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	NA	NA	ng/l	0.91 U	0.84 U	0.9 U	0.86 U
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	NA	NA	ng/l	0.91 U	0.84 U	0.9 U	0.86 U
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	NA	NA	ng/l	1.8 U	1.7 U	1.8 U	1.7 U

#### Notes:

			Lab	Sample Deli	very Group	2046067	2046067	2046067	2046067	2046067
				-	Location	GW-32D	GW-32S	GW-54D	GW-54D	QC
				Field S	ample Date	5/28/2019	5/28/2019	5/28/2019	5/28/2019	5/28/2019
				Field	Sample ID	OC-GW-32D-XXX	OC-GW-32S-XXX	OC-GW-54D-DUP	OC-GW-54D-XXX	OC-FB-052819
					QC Code	FS	FS	FD	FS	FB
Method	Fraction	Parameter	PALs	HAs	Units	Result Qualifier				
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	NA	NA	ng/l	<b>1.8</b> J	2.7 U	2.7 U	2.7 U	2.6 U
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	NA	NA	ng/l	2.7 U	2.7 U	2.7 U	2.7 U	2.6 U
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	40000	NA	ng/l	<b>0.87</b> J	0.91 U	<b>0.49</b> J	<b>0.54</b> J	0.87 U
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	NA	NA	ng/l	1.8 U	1.8 U	1.8 U	1.8 U	1.7 U
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	NA	NA	ng/l	1.8 U	1.8 U	1.8 U	1.8 U	1.7 U
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	70	NA	ng/l	1.4	<b>0.45</b> J	1.1 J	<b>1.1</b> J	0.87 U
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	70	NA	ng/l	<b>0.65</b> J	1.8 U	1.8 U	1.8 U	1.7 U
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	70	NA	ng/l	<b>1.8</b> J	1.8 U	<b>1.8</b> J	<b>1.7</b> J	1.7 U
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	70	NA	ng/l	<b>0.97</b> J	1.8 U	<b>1</b> J	<b>1.1</b> J	1.7 U
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	40	70	ng/l	8.1	<b>0.51</b> J	<b>1.5</b> J	<b>1.6</b> J	1.7 U
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	40	70	ng/l	5	1.7	2.2	2.4	0.87 U
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	NA	NA	ng/l	0.9 U	0.91 U	0.89 U	0.89 U	0.87 U
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	NA	NA	ng/l	0.9 U	0.91 U	0.89 U	0.89 U	0.87 U
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	NA	NA	ng/l	1.8 U	1.8 U	1.8 U	1.8 U	1.7 U

#### Notes:

			Lab	Sample Deli	very Group	2046391	2046391	2046391	2046391
				-	Location	GW-10DR	GW-305	GW-307	MP-1 #04
					ample Date		5/29/2019	5/29/2019	5/29/2019
				Field	Sample ID	OC-GW-10DR-XXX	OC-GW-305-XXX	OC-GW-307-XXX	OC-MP-1#4-XXX
					QC Code	FS	FS	FS	FS
Method	Fraction	Parameter	PALs	HAs	Units	Result Qualifier	Result Qualifier	Result Qualifier	Result Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	NA	NA	ng/l	2.7 U	2.6 U	2.7 U	2.7 U
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	NA	NA	ng/l	2.7 U	2.6 U	2.7 U	2.7 U
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	40000	NA	ng/l	<b>0.7</b> J	<b>0.55</b> J	1.2	<b>0.42</b> J
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	NA	NA	ng/l	1.8 U	1.7 U	1.8 U	1.8 U
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	NA	NA	ng/l	1.8 U	1.7 U	1.8 U	1.8 U
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	70	NA	ng/l	1.8	1.3	1.9	0.9 U
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	70	NA	ng/l	<b>0.38</b> J	1.7 U	1.8 U	<b>0.61</b> J
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	70	NA	ng/l	<b>1.7</b> J	<b>1.2</b> J	2.5	2.4
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	70	NA	ng/l	1 J	<b>0.69</b> J	<b>1.1</b> J	<b>0.82</b> J
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	40	70	ng/l	<b>1.6</b> J	<b>1.7</b> J	2.8	4.8
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	40	70	ng/l	6.4	2.9	5.4	11
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	NA	NA	ng/l	0.89 U	0.86 U	0.88 U	0.9 U
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	NA	NA	ng/l	0.89 U	0.86 U	0.88 U	0.9 U
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	NA	NA	ng/l	1.8 U	1.7 U	1.8 U	1.8 U

#### Notes:

Created by: KMS 8/15/19

Checked by: EAP 8/15/19

			Lab S	Sample Deliv	very Group	2046391	2052690
					Location	MP-1 #14	MP-1 #01
				Field Sa	ample Date	5/29/2019	5/29/2019
				Field	Sample ID	OC-MP-1#14-XXX	OC-MP-1#1-XXX
					QC Code	FS	FS
Method	Fraction	Parameter	PALs	HAs	Units	Result Qualifier	Result Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	NA	NA	ng/l	2.7 U	75 UJ
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	NA	NA	ng/l	2.7 U	75 UJ
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	40000	NA	ng/l	<b>0.82</b> J	25 UJ
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	NA	NA	ng/l	1.8 U	50 UJ
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	NA	NA	ng/l	1.8 U	50 UJ
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	70	NA	ng/l	1.5	25 UJ
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	70	NA	ng/l	<b>0.47</b> J	50 UJ
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	70	NA	ng/l	2	50 UJ
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	70	NA	ng/l	<b>1.2</b> J	50 UJ
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	40	70	ng/l	2.8	50 UJ
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	40	70	ng/l	5.1	25 UJ
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	NA	NA	ng/l	0.9 U	25 UJ
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	NA	NA	ng/l	0.9 U	25 UJ
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	NA	NA	ng/l	1.8 U	50 UJ

Notes:



## ATTACHMENT A FIELD DATA RECORDS

- 1			CORD - LO		ROUNDWAT	ER SAM	PLING				
	PROJECT	AN A	CAL SUPERFUND	SITE, WILMING	TON, MA	WE	ELL ID	3R-1		]	COMPREHENSIVE ROUND
	SAMPLE ID	00	13 R-1		$\overline{}$	SITE	TYPE	Superfund		]	DATE 5/38/19
	TIME	START [ 6	'30 EN	1033		JOB NUMBE	R	6107190016		]	BOTTLE TIME 1730
	QC SAI	MPLE CTED ID	SETTINGS	TO TO	JREMENT POINT DP OF WELL RISER DP OF PROTECTIVE THER	CASING	PROTECTIVE CASING STICK (FROM GROU		FT.	PROTE CASING DIFFER	G/WELL 1-0
	INITIAL DE TO WA		3-20	FT. WELL (TOR)		FT.	PID AMBIENT AIR	N/A	PPM	WELL DIAMET	4
	FINAL DE TO WA		0.00	FT. SCREE	1 1 1 1 1 1	FT.	PID WELL	N/A	5514	WELL	YES NO N/A
	DRAWDO VOLU (final - in	JME · (	Gich} or x 0.65 (4-inc		O OF DRAWDOWN I		MOUTH PRESSURE TO PUMP	N/A	PPM	] INTEGF	CASING COLLAR COLLAR
	TOTAL \ PURI	GED	68 ger minute) x time di	iAL. uration (minutes)	O 67 x 0.00026 gal/ml)		REFILL TIMER SETTING	N/A	SEC.	DISCHA TIMER SETTIN	N/A SEC.
	PURGE DA	ATA									
	TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
11	1637	8.40	725	Ville	24100	13.10	7.22	1.26	~}0.0	46	
	1647	8.23	300	11.41	अस्थिय	13.19	504	1.93	7394	46	
	1659	890	160	1132	20324	13.27	681	1.93	-321	46	Vole-150
	1705	19:21	100	11.00	19847	13.72	6.80	רטול	-17.3	46	
	1710	19.75		10.98	19092	13.34	1,62	In	-14.8	46	
-	( ) Del	10,00	150	10.98	19684	13:30	6.85	1,48	-24.1	76	
ŀ	1110	70,00	130		- (OK)	13.51	4.01	1. 6		- 1	
	TYPE C QE SIN X PEI	NT DOCUMEN OF PUMP OF BLADDER OF BLADDER OF BLADDER RISTALTIC	l		R TEFLON LINED SITY POLYETHYLEN	E	POI	PUMP MATERIAL LYVINYL CHLORIDE AINLESS STEEL ICON (Dedicated)		×	
- 1	ANALYTIC To Be Collec	AL PARAMET cted	ERS		THOD MBER		ESERVATION THOD	VOLUME REQUIRED		SAMPLE COLLECTED	2
	vo	Cs drazine, MMH, L	JDMH		60C d 8315 LC/MS/MS		L / 4 DEG. C	3 X 40 mL \		□ VO	Cs Irazine, MMH, UDMH
	ND				dified - EPA 521		EG. C - no sunli	×.		NDI	
		maldehyde als (Al, Cr, Fe, l	Mn, Mg, Na, As)		/-846 8315A 10C/6020A		EG. C ric Acid / 4 DEG.		Amber Glass Poly		maldehyde TALS
		solved Metals (/ avalent Chrom	Al, Cr, Fe, Mn, Mg, ium (Cr+6)	Na, As) 60°	10C/6020A 99		ric Acid / 4 DEG. EG. C - no headsp				SOLVED METALS (avalent Chromium (Cr+6)
	Am	monia			A 350.1	Sul	furic Acid / 4 DE	G. C 1 X 250 mL	Poly	Amı	monia
		ons (Chloride & ecific Gravity	Sulfate)	300 SM	0.0 12710F		EG. C EG. C	1 X 125 mL 1 X 500 mL		=	ons (Chloride & Sulfate) ecific Gravity
	PF	AS		Мо	dified - EPA 537	< 6	DEG. C	2 X 250 mL	HDPE	PF	AS
	PURGE OF PURGE WA CONTAINER		_	NUMBER OF G. GENERATED	ALLONS )	58	LOCATIONS	KETCH See	5,70	MP	A .
	NOTES										
			s are < 5 NTU, the								
	ır i urbidity	IS > 25 NTU I	then collect a filt	ered metals sai	пріе						wood.
	Sampled by: Sampler Sig	nature:	w			Che	ecked by:	mk			

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.	DI INC				
FIELD DATA RECORD - LOW FLOW GROUNDWATER SAM					
cot MA IIII-14	LL ID COMPREHENSIVE ROUND				
SAMPLE ID CONTROL SITE					
TIME START 1098 END 1197 JOB NUMBE	R 6107190016 BOTTLE TIME (1/3°				
WATER LEVEL / PUMP SETTINGS  QC SAMPLE COLLECTED ID  MEASUREMENT POINT  X TOP OF WELL RISER TOP OF PROTECTIVE CASING OTHER	PROTECTIVE CASING STICKUP (FROM GROUND)  PROTECTIVE CASING/WELL DIFFERENCE  A  C  T  T  T  T  T  T  T  T  T  T  T  T				
INITIAL DEPTH TO WATER FT. WELL DEPTH 39 FT. (TOR)	PID AMBIENT AIR N/A PPM DIAMETER 1/4 IN.				
FINAL DEPTH TO WATER  FT. SCREEN LENGTH FT.	PID WELL WELL YES NO N/A MOUTH N/A PPM INTEGRITY: CAP				
DRAWDOWN VOLUME (final - initial x 0.16 {2-inch} or x 0.65 {4-inch})  RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED	PRESSURE TO PUMP N/A PSI COLLAR				
TOTAL VOL. PURGED (purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)	REFILL TIMER N/A SEC. TIMER SETTING  DISCHARGE TIMER N/A SEC. SETTING				
PURGE DATA	SETTING SETTING				
DEPTH TO	DISS. 02 (mg/L) (10% > 0.5) TURBIDITY(NTU) ORP/Eh (mV) SAMPLE (10% > 0.5) (10% if >5 NTU)* (+/- 10 mV) COMMENTS				
1057 Nm 150 1291 87034 381	624 1/26 1249 225				
105 NW 160 1996 2003 381	834 170 DCK				
105 hm 150 1317 87732 3:76	204 0,51 16.1				
110 NM 150 1310 87617 3.74	1.63 0.37 175.8				
111 nm 150 13.04 87670 375	159 036 1733				
1120 nm 140 13.01 87623 3.70	1147 018 1101				
1100 13.00 875 3.71	1,48 0.18 168.6 0				
EQUIPMENT DOCUMENTATION					
TYPE OF PUMP TYPE OF TUBING	TYPE OF PUMP MATERIAL				
QED BLADDER TEFLON OR TEFLON LINED  SIMCO BLADDER X HIGH DENSITY POLYETHYLENE	POLYVINYL CHLORIDE STAINLESS STEEL				
X PERISTALTIC LDPE (Dedicated)	X SILICON (Dedicated)				
	ESERVATION VOLUME SAMPLE THOD REQUIRED COLLECTED				
_	L / 4 DEG. C 3 X 40 mL VOC vial VOCs				
The state of the s	etate Buffer 2 X 40 mL VOC vial Hydrazine, MMH, UDMH				
	EG. C - no sunlight 2 X 1L Amber Glass NDMA				
	EG. C       2 X 250mL Amber Glass       Formaldehyde         ic Acid / 4 DEG. C       1 X 250 mL Poly       METALS				
	ic Acid / 4 DEG. C 1 X 250 mL Poly DISSOLVED METALS				
The second of th	EG. C - no headspace 1 X 250 mL Poly Hexavalent Chromium (Cr+6)  furic Acid / 4 DEG. C 1 X 250 mL Poly Ammonia				
	EG. C 1 X 125 mL Poly Anions (Chloride & Sulfate)				
	EG. C 1 X 500 mL Poly Specific Gravity  DEG. C 2 X 250 mL HDPE				
PURGE OBSERVATIONS	LOCATION SKETCH				
PURGE WATER NUMBER OF GALLONS \	The way of the same of the sam				
NOTES	see site may				
* = If 3 turbidity readings are < 5 NTU, then parameter is stable	Pure water 912en/Efferves out				
If Turbidity is > 25 NTU then collect a filtered metals sample	Stown actua				
any well come	wood.				
Sampled by: Sampler Signature:	come Multi-Port Well June HI				

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC. FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING	
PROJECT OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA WELL ID MP-1-1-4	COMPREHENSIVE ROUND
SAMPLE ID OC-MP-1±H SITE TYPE Superfund	DATE 5/29/15
TIME START 917 END 1032 JOB NUMBER 6107190016	BOTTLE TIME 1020
WATER LEVEL / PUMP SETTINGS  QC SAMPLE COLLECTED ID  MEASUREMENT POINT  X TOP OF WELL RISER TOP OF PROTECTIVE CASING STICKUP OTHER OTHER  (FROM GROUND)  7 3 7 FT.	PROTECTIVE CASING/WELL DIFFERENCE
INITIAL DEPTH TO WATER FT. WELL DEPTH 29 PID	WELL i/u
FINAL DEPTH TO WATER  (TOR)  FT. AMBIENT AIR  N/A  PPM  FT. SCREEN  PID WELL	DIAMETER NO N/A
LENGTH	INTEGRITY: CAP  CASING  LOCKED  COLLAR
TOTAL VOL. PURGED GAL.  REFILL TIMER N/A SEC.	DISCHARGE N/A SEC.
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml) SETTING  PURGE DATA	SETTING
DEPTH TO   PURGE RATE   TEMP.   SPEC. COND.   pH (units)   DISS. 02   TURBIDITY(NTU)   ORP/Eh (m// IMB   WATER (ft.)   (ml/min)   (deg. C)   (us/cm)   (v// 0.1 min)   (deg. C)   (us/cm)   (v// 0.1 min)   (deg. C)   (de	* I (1971)
(0.3 ft.) (100-400) (3%) (3%) (47-6.1 till) (10% > 0.5) (10% ii > 5 (10) (47-10 iii))	COMMENTS
975 JUAN 160 1760 C226 200 782 623 1276	30'
935 NM 100 1260 866 1 3.91 N.67 3.30 W.6	
940 Nm 50 1271 6582 3.85 3.88 0.46 1067	
141 Mm 120 1378 6244 3.83 8.81 0.35 1024	
950 nm 150 1230 6507 382 215- 039 487	
954 hm 150 1195 6493 3.83 1.75 0.57 982 1000 hm 150 1291 6420 3.83 1.48 0.27 949	
1005 mm 150 22 6441 382 626 0-21 941	
1010 Mm 120 1284 G421 382 1.20 0.19 913	
1010 Mm 1(~ 12.86 6707 3.82 1.15 0.56 84.	3 4
EQUIPMENT DOCUMENTATION  TYPE OF PUMP  TYPE OF TUBING  TYPE OF PUMP MATERIAL	
QED BLADDER TEFLON OR TEFLON LINED POLYVINYL CHLORIDE	
SIMCO BLADDER  X HIGH DENSITY POLYETHYLENE  STAINLESS STEEL  X PERISTALTIC  LDPE (Dedicated)  X SILICON (Dedicated)	
ANALYTICAL PARAMETERS	
To Be Collected METHOD PRESERVATION VOLUME NUMBER METHOD REQUIRED	SAMPLE COLLECTED
VOCs 8260C HCL / 4 DEG. C 3 X 40 mL VOC vial	VOCs
Hydrazine, MMH, UDMH Mod 8315 LC/MS/MS Acetate Buffer 2 X 40 mL VOC vial  NDMA Modified - EPA 521 4 DEG. C - no sunlight 2 X 1L Amber Glass	Hydrazine, MMH, UDMH NDMA
Formaldehyde SW-846 8315A 4 DEG. C 2 X 250mL Amber Glass	Formaldehyde
Metals (AI, Cr, Fe, Mn, Mg, Na, As) 6010C/6020A   Nitric Acid / 4 DEG. C 1 X 250 mL Poly	METALS DISSOLVED METALS
Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As) 6010C/6020A Nitric Acid / 4 DEG. C 1 X 250 mL Poly  Hexavalent Chromium (Cr+6) 7199 4 DEG. C - no headspace 1 X 250 mL Poly	Hexavalent Chromium (Cr+6)
Ammonia EPA 350.1 Sulfuric Acid / 4 DEG. C 1 X 250 mL Poly	Ammonia
Anions (Chloride & Sulfate) 300.0 4 DEG. C 1 X 125 mL Poly  Specific Gravity SM2710F 4 DEG. C 1 X 500 mL Poly	Anions (Chloride & Sulfate)  Specific Gravity
Specific Gravity	PFAS
PURGE OBSERVATIONS  PURGE WATER  NUMBER OF GALLONS  LOCATION SKETCH See SAL	who
CONTAINERIZED YES NO GENERATED MICONEIL # 1 ZULE	
NOTES *= If 3 turbidity readings are < 5 NTU, then parameter is stable  Level hat measures	1
If Turbidity is > 25 NTU then collect a filtered metals sample	1
*= If 3 turbidity readings are < 5 NTU, then parameter is stable  If Turbidity is > 25 NTU then collect a filtered metals sample  Sampled by: Sampled by: Sampled Signature:  Checked by:  Checked by:	wood.
Sampled by: Checked by: Checked by:	

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.	
FIELD DATA RECORD - LOW FLOW GROUNDWATER SA	AMPLING
PROJECT OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA	WELL ID MPA 419 COMPREHENSIVE ROUND
SAMPLE ID OC-MP-1414-XXX	SITE TYPE Superfund DATE 5/34/14
912	9,0
	MBER 010/190016 BOTTLE TIME 10
WATER LEVEL / PUMP SETTINGS  QC SAMPLE COLLECTED ID  MEASUREMENT POINT X TOP OF WELL RISER TOP OF PROTECTIVE CASING OTHER	PROTECTIVE CASING STICKUP (FROM GROUND)  PROTECTIVE CASING / WELL DIFFERENCE  CASING / WELL DIFFERENCE
INITIAL DEPTH TO WATER FT. WELL DEPTH 39	
FINAL DEPTH TO WATER FT. SCREEN SCREEN	PID AMBIENT AIR N/A PPM DIAMETER IN.  PID WELL YES NO N/A
DRAWDOWN VOLUME GAL. RATIO OF DRAWDOWN VOLUME	MOUTH N/A PPM INTEGRITY: CAP
(final - initial x 0.16 (2-inch) or x 0.65 (4-inch)) TO TOTAL VOLUME PURGED	TO PUMP N/A PSI COLLAR
TOTAL VOL. PURGED (purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)	REFILL TIMER N/A SEC. SETTING DISCHARGE TIMER N/A SEC. SETTING
PURGE DATA	
TIME DEPTH TO WATER (ft.) (ml/min) (deg. C) (μS/cm) (+/- 0.1 (100-400) (3%) (3%)	
824 Begin Purge 1242 1112 20	6 2 /3 11 4 2/2 11/
936 AM 190 1216 904 67	
84 nm 150 12 21 854 67	334 100 111
346 nm 15 1244 834 67	1 3.04 69 691
851 mm 10 1340 826 67	
856 hm 150 1206 813 67	0 339 5.4) 732
got hm 150 12.06 \$13 67	0 239 229 81.5 1
EQUIPMENT DOCUMENTATION	
TYPE OF PUMP TYPE OF TUBING  QED BLADDER TEFLON OR TEFLON LINED	TYPE OF PUMP MATERIAL POLYVINYL CHLORIDE
SIMCO BLADDER X HIGH DENSITY POLYETHYLENE	STAINLESS STEEL
X PERISTALTIC LDPE (Dedicated)	X SILICON (Dedicated)
ANALYTICAL PARAMETERS           To Be Collected         METHOD           NUMBER	PRESERVATION VOLUME SAMPLE METHOD REQUIRED COLLECTED
VOCs 8260C	HCL / 4 DEG. C 3 X 40 mL VOC vial VOCs
Hydrazine, MMH, UDMH Mod 8315 LC/MS/MS	Acetate Buffer 2 X 40 mL VOC vial Hydrazine, MMH, UDMH
NDMA Modified - EPA 521 Formaldehyde SW-846 8315A	4 DEG. C - no sunlight 2 X 1L Amber Glass NDMA  4 DEG. C 2 X 250mL Amber Glass Formaldehyde
Metals (Al, Cr, Fe, Mn, Mg, Na, As) 6010C/6020A	Nitric Acid / 4 DEG. C 1 X 250 mL Poly METALS
Dissolved Metals (AI, Cr, Fe, Mn, Mg, Na, As) 6010C/6020A  Hexavalent Chromium (Cr+6) 7199	Nitric Acid / 4 DEG. C 1 X 250 mL Poly DISSOLVED METALS  4 DEG. C - no headspace 1 X 250 mL Poly Hexavalent Chromium (Cr+6)
Hexavalent Chromium (Cr+6) 7199 Ammonia EPA 350.1	4 DEG. C - no headspace 1 X 250 mL Poly Hexavalent Chromium (Cr+6)  Sulfuric Acid / 4 DEG. C 1 X 250 mL Poly Ammonia
Anions (Chloride & Sulfate) 300.0	4 DEG. C 1 X 125 mL Poly Anions (Chloride & Sulfate)
Specific Gravity SM2710F PFAS Modified - EPA 537	4 DEG. C 1 X 500 mL Poly Specific Gravity < 6 DEG. C 2 X 250 mL HDPE PFAS
PURGE OBSERVATIONS	LOCATION SKETCH See Ste Mo
PURGE WATER CONTAINERIZED  YES  NO  GENERATED  O  O  O  O  O  O  O  O  O  O  O  O  O	My Alba Carre
NOTES	taken- (microwii) we water Lough
* = If 3 turbidity readings are < 5 NTU, then parameter is stable	
If Turbidity is > 25 NTU then collect a filtered metals sample	Effervescott 7 me 14
Mailtalle Long	Multi-Port Well Zone 14 Wood.
Sampled by: Sampler Signature:	Checked by:
Sampler Signature:	an

WOOD ENVIRO				ITIONS, INC. ROUNDWAT	ER SAMI	PLING				
			SITE, WILMINGTO				-W-10	DR	]	COMPREHENSIVE DOLIND
SAMPLE ID O	C-6-W	U -10	0R-XX	<u> </u>	SITE T		Superfund	<i>-</i>	]	DATE COMPREHENSIVE ROUND
TIME STAR	130	(C)	1430		JOB NUMBE		6107190016		Ì	BOTTLE TIME 1 1/20
WATER LEVEL /		TINGS		REMENT POINT					-	
QC SAMPLE COLLECTED I		0	то	P OF WELL RISER P OF PROTECTIVE HER	CASING	PROTECTIVE CASING STIC	KUP	1 <sub>FT.</sub>	PROTEC CASING DIFFERI	/WELL -0.1/
INITIAL DEPTH TO WATER	5.5	84 =	T. WELL D		()	(FROM GROU	ind)	Г.	] WELL	ENCE TEL.
FINAL DEPTH	5.8	<i>و</i> ا	(TOR)	d.	Y FT.	AMBIENT AIR	N/A	PPM	DIAMET	
TO WATER DRAWDOWN	3.0	, a	T. SCREEI		FT.	PID WELL MOUTH	N/A	PPM	WELL INTEGR	YES NO N/A ITY: CAP — — — —
VOLUME (final - initial x (	0.16 (2-inch)	or x 0.65 (4-inc		OF DRAWDOWN Y		PRESSURE TO PUMP	N/A	PSI	]	LOCKED E E
TOTAL VOL.		2		CAR	v	REFILL	N/A	050	DISCHA	7777777
PURGED (purge rate (mi	illiliters per mi	nute) x time du	ration (minutes) x	0.00026 gal/ml)	4	TIMER SETTING	N/A	SEC.	SETTING	N/A SEC.
PURGE DATA	РТН ТО ТР	PURGE RATE	TEMP.	SPEC. COND.		DISS. O2		T		
TIME WA	TER (ft.) 0.3 ft.)	(ml/min) (100-400)	(deg. C) (3%)	(μS/cm) (3%)	pH (units) (+/- 0.1 unit)	(mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
100	360-17	- Kyr	1009	1075	5.83	0.00	~7/1 ~7	-332	317	
	86	160	10.31	665	6,07	9.50	9.88	-10.6	27	
13 76 5	86	190	10.41	531	6.17	1.35	2133	-18.9	24	
	86	120	10.35	381	6.33	1,63	5.96	-18.0	74	
	86	160	10.94	327	6,19	1.66	3.39	-18.8	24	
	56	150	1073	383	618	1.61	2.70	-314	24	
	36	150	1030	364	6.28	1.50	1,05	-35.8	24	
1916 5.	40	150	10.40	76 1	6.28	1.10	((1)	3319	<i>p</i> 7	
EQUIPMENT DO			TYPE OF TUBIN	3		TYPE OF	PUMP MATERIAL			
QED BLA	DDER		TEFLON OF	R TEFLON LINED		PO	LYVINYL CHLORIDE			
X PERISTAL			X HIGH DENS	ITY POLYETHYLEN cated)	E		AINLESS STEEL  ICON (Dedicated)			
ANALYTICAL PA	RAMETERS	3		TUOD.	5.5	EOEDWATION.	VOLUME		OAND 5	
To Be Collected				THOD MBER		ESERVATION THOD	VOLUME REQUIRED		SAMPLE COLLECTED	
VOCs			826			L/4 DEG. C	3 X 40 mL V		Voc	
Hydrazine,	, MMH, UDMI	-1		8315 LC/MS/MS lified - EPA 521		etate Buffer EG. C - no sunl	2 X 40 mL V ight 2 X 1L Amb		NDV	razine, MMH, UDMH MA
Formaldeh	nyde , Cr, Fe, Mn, N	Ma Na As\		-846 8315A DC/6020A		EG. C		Amber Glass	Form	naldehyde
		r, Fe, Mn, Mg, N		DC/6020A		ic Acid / 4 DEG		(8)		SOLVED METALS
Hexavalen Ammonia	nt Chromium (	(Cr+6)	719: EPA	9 . 350.1		EG. C - no heads furic Acid / 4 DE		201	Hexa	avalent Chromium (Cr+6) nonia
S-100	nloride & Sulfa	ate)	300			EG. C	1 X 125 mL	Poly	_	ns (Chloride & Sulfate)
Specific Gr	ravity			710F ified - EPA 537		EG. C DEG. C	1 X 500 mL 2 X 250 mL		Spe	cific Gravity AS
PURGE OBSERV	/ATIONS					LOCATION S	KETCH SEL	(10	11.10	
PURGE WATER CONTAINERIZED	YES		NUMBER OF GA GENERATED	LLONS 1.2		0 x		sile	yra p	
NOTES		94 09694	paratrioned baseline	) <del></del>		7 110h	s odur	r 1	7 .	17 .
* = If 3 turbidity re	eadings are	e < 5 NTU, the	en parameter is	stable	f	write	water is	Lo lord	1 7e	1100
If Turbidity is > 2	5 NTU then	collect a filte	ered metals sam	ple						
	well	Lowin	•							Wood.
Sampled by:	. N. 1 A	11 ha			Che	ecked by: CT	m			0
Sampler Signature:	MMA	NIV								

					ER SAMI	PLING							
PROJECT	OLIN CHEMICA	AL SUPERFUND	SITE, WILMINGT	ON, MA	WE	LLID GI	W-15		]		COMF	REHENSIVE R	DUND
SAMPLE ID	E ID					TYPE	Superfund		]			DATE S	28/2019
TIME			1/00		JOB NUMBE	R	6107190016				вотт	TLE TIME 15	1:57
QC SAM	MPLE	ETTINGS	X TO	P OF WELL RISER P OF PROTECTIVE (	CASING	PROTECTIVE CASING STIC (FROM GROU		FT.	C	ROTEC ASING	/ WEL	L 0.39	FT.
INITIAL DEF		01 F				PID			] w	/ELL		3"	•
FINAL DEF	1/1	50		10.5	FT.	AMBIENT AIR	N/A	PPM		IAMETE	ER	YES	IN. NO N/A
DRAWDO		(0)	LENGT	H GIOIC S	FT.	MOUTH	N/A	PPM		NTEGRI	CA	CAP 💥	
						PRESSURE TO PUMP	N/A	PSI				LLAR X	
PURG	GED 3	- 4	714.			REFILL TIMER SETTING	N/A	SEC.	Т	ISCHAI IMER ETTING		N/A	SEC.
PURGE DA													
TIME	WATER (ft.)	(ml/min)	(deg. C)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAM			СОММЕ	ENTS	
1430	/	/	1	1	/	1	1	/	/		BE	GIN PUR	
1435					5.66	1.18	48.4	126.4	NI	-			
1440					5.65	0.97	88.5	134.4	-1		ORA	NGE FLOC	-
1445			-		5.60	0.92	51.3	141.4				}	
1455					5.59	0.77	37.7	147.3					
1500					5.62	1.07	53.1	152.6					
1505					5.64	1.71	22.8	151.2					
1510	10.56	125		0.062	5.63	2.40	23.2	144.9					
1515	10.51	100		0.061	5.63	2.49	22.9	143.8					
1520					5.62	2.32	17.3	144.0	1	,			
1525			10.46	0.061	5.87	1.96	38.3	135.6	•				
		ATION	TYPE OF TURIN	G		TYPE OF	PUMP MATERIAL						
							LYVINYL CHLORIDE						
			=		≣	ST	AINLESS STEEL		-lac	1	- h	co - 1-0	
			LDPE (Dedi	cated)		X SIL	ICON (Dedicated)	NEW 03	128	1200	P	re gapt	
To Be Collec		RS				ESERVATION THOD	VOLUME REQUIRED			IPLE ECTED			
voo	Os		826	0C	нс	L/4 DEG. C	3 X 40 mL V	OC vial		∐voc	s		
1 生		МН	Mod	8315 LC/MS/MS	Ace	etate Buffer	2 X 40 mL V	OC vial		Hydr	azine,	ММН, UDMH	
						EG. C - no sunl EG. C		er Glass Amber Glass	=	NDM		uda	
		n, Mg, Na, As)				ric Acid / 4 DEG.			H	MET.		yue	
			Na, As) 601	0C/6020A	Nitr	ric Acid / 4 DEG.	C 1 X 250 mL	Poly	4	DISS	OLVE	D METALS	
=		n (Cr+6)				EG. C - no heads			4	=		t Chromium (Cr+	6)
		ulfate)				furic Acid / 4 DE EG. C	G. C 1 X 250 mL 1 X 125 mL	421 B	H	Amm		loride & Sulfate)	
Spec	cific Gravity		SM2	?710F		EG. C	1 X 500 mL		Ī	Spec	ific Gr		
₩ PFA	PFAS Modified - EPA 537					DEG. C	2 X 250 mL	HDPE	5	₹ PFA	S		
PURGE OB	SERVATIONS					LOCATION S	KETCH						
PURGE WAT CONTAINER				3.5g4									
NOTES	-156	pr 1 may 1											
			en parameter is										
III Turbialty	13 2 43 IN I U THE	on conect a fifte	ered metals sam	hie									
											WO	Od.	
Sampled by:	IANDESJ	9RLAS			Che	ecked by:	m					7 7	
Sampler Sign		02					9.5						

			JCTURE SOLU N FLOW G	JTIONS, INC. ROUNDWAT	ER SAMI	PLING				
PROJECT	OLIN CHEMICA	AL SUPERFUND	SITE, WILMINGTO	ON, MA	WE	LLID GU	1-15		]	COMPREHENSIVE ROUND
SAMPLE ID		J-15-X>			SITE		Superfund		ĺ	DATE 05/28/2019
TIME	START 142		1620		JOB NUMBE	R	6107190016		]	BOTTLE TIME 15:57
Annual Annual Control of Cold Con-	EVEL / PUMP SE	ETTINGS		REMENT POINT		DDOTEOTIVE			DDOTE	OTIVE
QC SAN COLLEC	CTED ID	/	ТО	P OF WELL RISER P OF PROTECTIVE HER	CASING	PROTECTIVE CASING STIC (FROM GROU	KUP / OCT	FT.	PROTE CASING DIFFER	G/WELL CO 2G
INITIAL DE		.0) F	T. WELL D			PID			) ] WELL	
FINAL DE		50	(TOR)	18.3	FT.	AMBIENT AIR	N/A	PPM	DIAMET	
TO WA	NA/AL		T. SCREET	/	FT.	PID WELL MOUTH	N/A	PPM	WELL INTEGF	YES NO N/A  RITY: CAP 2
DRAWDO VOLU (final - ir	IME O	9 G/ h) or x 0.65 {4-inc		O OF DRAWDOWN V		PRESSURE TO PUMP	N/A	PSI		LOCKED COLLAR
TOTAL \		5 g/	AL.	0.26		REFILL TIMER	N/A	SEC.	DISCHA TIMER	ARGE N/A SEC.
			ration (minutes) x	0.00026 gal/ml)		SETTING			SETTIN	
PURGE DA	ATA DEPTH TO	PURGE RATE	TEMP.	SPEC. COND.	1	DISS. O2		T		
TIME	WATER (ft.) (0.3 ft.)	(ml/min) (100-400)	(deg. C) (3%)	(μS/cm) (3%)	pH (units) (+/- 0.1 unit)	(mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
	DFRIM	PG 10 \$2	1	6.27	V 27	0 ::0	20.0		-	1
1530	10,50	100	10.57	0.076	5.87	3.03	35.2 39.1	133.5		
1540	10.50	100	10.51	0.075	5.85	3.12	41.4	125.2		
1545	10.50	100	10.52	0.076	5.84	2.04	46.0	123.5	1	
1550	10.50	100	10.51	0.076	5.87	2.01	49.0	120.4		
1555	10.50	100	10.59	0.080	5.43	2.06	47.0	119.0	~16	Could Sampy
1	/	/			/				10	2
/	/	ı	/	- (		<u> </u>	1	/	/	/
	IT DOCUMENT. F PUMP	ATION	TYPE OF TUBIN	<u>G</u>		TYPE OF	PUMP MATERIAL			
	D BLADDER			R TEFLON LINED			LYVINYL CHLORIDE			
	ICO BLADDER RISTALTIC		X HIGH DENS	SITY POLYETHYLEN cated)	E	X SIL	AINLESS STEEL  ICON (Dedicated)	1E10 05/	28/2014	PER RAPP
	AL PARAMETE	RS		rhod	PRI	ESERVATION	VOLUME	1000	SAMPLE	10100011
1			NUM	MBER		THOD	REQUIRED		COLLECTED	2
Voc		NA. I	826 Mar			L / 4 DEG. C	3 X 40 mL V		Voc	
Hayo	Irazine, MMH, UD MA	IVII		I 8315 LC/MS/MS lified - EPA 521		etate Buffer EG. C - no suni	2 X 40 mL V light 2 X 1L Amb		MNDI	drazine, MMH, UDMH MA
	maldehyde			-846 8315A		EG. C		Amber Glass		maldehyde
	als (Al, Cr, Fe, Mr solved Metals (Al.	n, Mg, Na, As) Cr, Fe, Mn, Mg, N		0C/6020A 0C/6020A		ic Acid / 4 DEG ic Acid / 4 DEG			D DIS	TALS SOLVED METALS
	avalent Chromiur		719			EG. C - no heads		150	=	xavalent Chromium (Cr+6)
Amr		ulfata)		350.1		furic Acid / 4 DE			=	monia
	ons (Chloride & Si cific Gravity	uliale)	300. SM2	710F		EG. C EG. C	1 X 125 mL 1 X 500 mL	170 170 IV		ons (Chloride & Sulfate) ecific Gravity
¥ PF/	AS		Mod	ified - EPA 537	< 6	DEG. C	2 X 250 mL	HDPE	PF.	AS
PURGE OB	SERVATIONS					LOCATION S	KETCH			
PURGE WAT CONTAINER			NUMBER OF GA GENERATED	3.5g	.11-					
NOTES										
* = If 3 turb	idity readings a	are < 5 NTU, the	n parameter is	stable						
If Turbidity	is > 25 NTU the	en collect a filte	red metals sam	ple						
										wood.
Sampled by:	I AN DESJA	RLAS			Che	ecked by:				11 000
Sampler Sign		2				, ,	(17)			

			N FLOW G	ROUNDWAT	ER SAME	PLING						
PROJECT	OLIN CHEMICA	AL SUPERFUND	SITE, WILMINGT	ON, MA	WEL	LID GW	-16R		]	COMPREH	ENSIVE ROUND	
SAMPLE ID	OC-GI	W-16R->	×χχ		SITE T		Superfund		j	DA	TE 5/28/2014	9
TIME	START 12:	10 ENI	1410		JOB NUMBER	3	6107190016			BOTTLE T	IME 13:47	
	VEL / PUMP SE	ETTINGS		REMENT POINT								
QC SAM COLLEC		Section 1990	то	P OF WELL RISER P OF PROTECTIVE ( HER	CASING	PROTECTIVE CASING STIC (FROM GROU		FT.	PROTE CASING DIFFER	G / WELL	-0.27 FT.	
INITIAL DEF		79 F	T. WELL (	DEPTH 17.3		PID AMBIENT AIR	N/A	PPM	WELL DIAME	TED (	2'' IN.	
FINAL DEF	TER 10.	95 F	T. SCREE	N E		PID WELL			WELL		YES NO N	N/A
DRAWDO VOLU	ME 0.0			OF DRAWDOWN V	/OLUME	MOUTH PRESSURE	N/A	PPM	] INTEGE	CASING LOCKED	$\frac{\overline{\lambda}}{\lambda}$	_
TOTAL V	/OI	h) or x 0.65 {4-inc		TOTAL VOLUME PUI		TO PUMP	N/A	PSI	] DISCH	COLLAR ARGE		_
PURG (purge ra		minute) x time du	AL. ration (minutes) x	0.003 0.00026 gal/ml)		TIMER SETTING	N/A	SEC.	TIMER SETTIN	IG	N/A SEC.	
PURGE DA	7000000											
TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. S/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)		COMMENTS	
1250	/	200	/	/	/	/			~15'		PURCE	
1300						1.70	84.0	42.5	-		FLIWTHRU CELL	
1315	15 10.93 150 11.56 0.188 6.5 115 10.93 150 11.51 0.189 6.					1.56	17.0	aa.5 aa.a		10000	TURBIDITY	
1320	10.94	150	11.39	0.189	6.39	1.18	12.0	24.2				
1325	10.94	150	11.53	0.188	6.40	0.89	6.51	27.1				
1330	10.95	150	11.60	0-186	6.39	0.92	4.54	77.3				
1335	10.95	150	11.64	0.186	6.40	0.86	4.53	28.)				
1340	10.95	150	11.60	0.186	6.39	0.3)	3.54	27.9	1			
1345	10,95	150	11.60	/ / / /	640	0.87	3.02	28.0		COLANE	CTSAMPUR	
(311		-/	/	/	/				1	(0000	- C 353 pri 01-	
EQUIPMEN	IT DOCUMENT	ATION			'							
TYPE O		•	TYPE OF TUBIN	_			PUMP MATERIAL					
	D BLADDER ICO BLADDER		=	R TEFLON LINED BITY POLYETHYLEN	E	· = ST.	LYVINYL CHLORIDE AINLESS STEEL		,			
X PEF	RISTALTIC		LDPE (Dedi	cated)		X SIL	ICON (Dedicated) —	NEW 05	28/19	PER O/	IPP	
ANALYTICA To Be Collect	AL PARAMETE ted	RS		THOD MBER		ESERVATION THOD	VOLUME REQUIRED		SAMPLE COLLECTE	2		
□ voc	20		826			_/4 DEG. C			□vo			
	os Irazine, MMH, UD	MH		8315 LC/MS/MS		tate Buffer	3 X 40 mL V 2 X 40 mL V			os drazine, MMH	, UDMH	
NDN			Mod	dified - EPA 521		EG. C - no sunl	•		ND			
	maldehyde als (Al, Cr, Fe, Mr	n Mo Na As)		-846 8315A 0C/6020A		EG. C c Acid / 4 DEG		Amber Glass		maldehyde TALS		
		Cr, Fe, Mn, Mg, N		0C/6020A		c Acid / 4 DEG				SOLVED ME	TALS	
	avalent Chromiur	m (Cr+6)	719			EG. C - no heads			=		omium (Cr+6)	
	monia ons (Chloride & Si	ulfate)	300	A 350.1 .0		uric Acid / 4 DE EG. C	G. C 1 X 250 mL 1 X 125 mL		=	monia ons (Chloride	& Sulfate)	
	cific Gravity	unato,		2710F		EG. C	1 X 500 mL		Spe	ecific Gravity		
PFA	AS		Mod	lified - EPA 537	< 6	DEG. C	2 X 250 mL	HDPE	X PF	AS		
PURGE OB	PURGE OBSERVATIONS						KETCH					
PURGE WAT CONTAINER		NO	NUMBER OF GA GENERATED	LLONS 2.25	5_							
NOTES												
* = If 3 turbi	idity readings a	are < 5 NTU, the	en parameter is	stable								
If Turbidity	is > 25 NTU the	en collect a filte	ered metals san							MOOG		
										\	MOOC	7
Sampled by:	IAN DESS	ARLAS			Che	cked by:				,		
Sampler Sign		J'A					CITA				(A)	

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.							
FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING							
PROJECT OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA	WELL ID FW-335	COMPREHENSIVE ROUND					
SAMPLE ID OC-GW-375- XXX	SITE TYPE Superfund	DATE 5/88/19					
TIME START 1513 END 1600 JOB NU	MBER 6107190016	BOTTLE TIME 1555					
WATER LEVEL / PUMP SETTINGS  QC SAMPLE COLLECTED ID  WEASUREMENT POINT X TOP OF WELL RISER TOP OF PROTECTIVE CASING OTHER	PROTECTIVE CASING STICKUP (FROM GROUND)	PROTECTIVE CASING / WELL DIFFERENCE TO 32-T.					
INITIAL DEPTH TO WATER 8.46 FT. WELL DEPTH	PID	WELL 313					
FINAL DEPTH TO WATER 8.59 FT. SCREEN 1.5 FT.	AMBIENT AIR N/A PPM PID WELL	DIAMETER IN.  WELL YES NO N/A INTEGRITY: CAP					
DRAWDOWN VOLUME (final - initial x 0.16 (2-inch) or x 0.65 (4-inch))  LENGTH FT.  RATIO OF DRAWDOWN VOLUME 7TO TOTAL VOLUME PURGED	MOUTH	CASING LOCKED COLLAR					
TOTAL VOL. PURGED GAL.	REFILL TIMER N/A SEC.	DISCHARGE TIMER N/A SEC.					
(purge rate (milliliters our minute) x time duration (minutes) x 0.00026 gal/ml)	SETTING	SETTING					
PURGE DATA  DEPTH TO PURGE RATE TEMP. SPEC. COND.	D100 00	——————————————————————————————————————					
TIME WATER (ft.) (ml/min) (deg. C) (μS/cm) (+/- 0.1 (μS/cm) (3%)		SAMPLE DEPTH (ft.) COMMENTS					
1524 8 61 178 1071 48 5.8	7.80 25.1 100	13'					
1529 9.59 150 10.65 40 52	1 466 161 24.7	13					
1534 3.59 50 10.61 36 5.0	3 4.53 2.98 202	13					
1539 859 150 10-65 35- 49	8 420 1.59 16.9	13					
1)11 0.31 1)	7 4.20 1.28 16.2 13 4.13 1.30 14.2	13					
137   3-34   13 0 10 10 10 3 3 9.	3 (11) (30 14.1						
EQUIPMENT DOCUMENTATION  TYPE OF PUMP  TYPE OF TUBING	TYPE OF PUMP MATERIAL						
QED BLADDER TEFLON OR TEFLON LINED	POLYVINYL CHLORIDE						
SIMCO BLADDER  X PERISTALTIC  X PERISTALTIC  X HIGH DENSITY POLYETHYLENE  LDPE (Dedicated)	X SILICON (Dedicated)						
ANALYTICAL PARAMETERS	X SILICON (Dedicated)						
To Be Collected METHOD NUMBER	PRESERVATION VOLUME METHOD REQUIRED C	SAMPLE OLLECTED					
VOCs 8260C	HCL / 4 DEG. C 3 X 40 mL VOC vial	VOCs					
Hydrazine, MMH, UDMH Mod 8315 LC/MS/MS	Acetate Buffer 2 X 40 mL VOC vial	Hydrazine, MMH, UDMH					
NDMA Modified - EPA 521 Formaldehyde SW-846 8315A	4 DEG. C - no sunlight 2 X 1L Amber Glass 4 DEG. C 2 X 250mL Amber Glass	NDMA Formaldehyde					
Metals (Al, Cr, Fe, Mn, Mg, Na, As) 6010C/6020A	Nitric Acid / 4 DEG. C 1 X 250 mL Poly	METALS					
Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As) 6010C/6020A	Nitric Acid / 4 DEG. C 1 X 250 mL Poly	DISSOLVED METALS					
Hexavalent Chromium (Cr+6) 7199 Ammonia EPA 350.1	4 DEG. C - no headspace 1 X 250 mL Poly Sulfuric Acid / 4 DEG. C 1 X 250 mL Poly	Hexavalent Chromium (Cr+6)  Ammonia					
Anions (Chloride & Sulfate) 300.0	4 DEG. C 1 X 125 mL Poly	Anions (Chloride & Sulfate)					
Specific Gravity SM2710F  PFAS Modified - EPA 537	4 DEG. C 1 X 500 mL Poly < 6 DEG. C 2 X 250 mL HDPE	Specific Gravity PFAS					
PURGE OBSERVATIONS  PURGE WATER  NUMBER OF GALLONS	studies Stee Wil	P					
CONTAINERIZED YES NO GENERATED NOTES	Stainess they were	, ,					
* = If 3 turbidity readings are < 5 NTU, then parameter is stable							
If Turbidity is > 25 NTU then collect a filtered metals sample		_					
MALH LOW		wood.					
Sampled by: Sampler Signature:		WUUU.					
Sampled by: Sampler Signature:	Checked by:						

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.								
FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING								
PROJECT OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA	WELL ID GW-32D	COMPREHENSIVE ROUND						
SAMPLE ID 0 C- G-W-320-774	SITE TYPE Superfund	DATE SIBSIA						
TIME START 1915 END STITE JOB NO.	JMBER 6107190016	BOTTLE TIME SUST						
WATER LEVEL / PUMP SETTINGS  QC SAMPLE COLLECTED ID  WEASUREMENT POINT  X TOP OF WELL RISER TOP OF PROTECTIVE CASING OTHER	PROTECTIVE CASING STICKUP (FROM GROUND)  FT.	PROTECTIVE CASING/WELL DIFFERENCE						
INITIAL DEPTH TO WATER 8.62 FT. WELL DEPTH 7.	PID	WELL DIAMETER IN.						
FINAL DEPTH TO WATER FT. SCREEN SCREEN LENGTH LENGTH	AMBIENT AIR	WELL YES NO N/A						
DRAWDOWN VOLUME (final - initial x 0.16 (2-inch) or x 0.65 (4-inch))  LENGTH FT.  RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED	PRESSURE TO PUMP N/A PSI	INTEGRITY: CAP  CASING LOCKED COLLAR						
TOTAL VOL. PURGED GAL.	REFILL TIMER N/A SEC.	DISCHARGE TIMER N/A SEC.						
(purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)	SETTING	SETTING						
PURGE DATA  DEPTH TO PURGE RATE TEMP. SPEC. COND. 2116	pite) DISS. 02 THEREIDITY/AITH ORR/Sh (m)/A	244815						
TIME WATER (ft.) (ml/min) (deg. C) (μS/cm) (+/- 0.1 (μS/cm) (π/cm) (π/c	(mg/l)   (mg/l)   TUNDIDITY (NTU)   UNF/EII (IIIV)	SAMPLE DEPTH (ft.) COMMENTS						
1924 862 150 1121 B1266 6	7 212 396 89	<b>28</b> '						
1453 8 62 130 1121 1136 65		35						
1438 8.62 100 16.22 9264 6.8	2 111 3.74 -25.7	3}						
निन्द ६७३ १६० १७३३ वाव ६३ ६४	5 1.00 334 -341	3,6						
1948 862 180 11.23 01261 68		51						
1763 8.68 120 1133 1136 68		28						
1203 8.67 160 1111 320 68		38						
1703 3.62 17 141 3.30 0.80	0.45 1.69 15.1	a o						
EQUIPMENT DOCUMENTATION								
TYPE OF PUMP TYPE OF TUBING  QED BLADDER TEFLON OR TEFLON LINED	TYPE OF PUMP MATERIAL  POLYVINYL CHLORIDE							
SIMCO BLADDER  X HIGH DENSITY POLYETHYLENE	STAINLESS STEEL							
X PERISTALTIC LDPE (Dedicated)	X SILICON (Dedicated)							
ANALYTICAL PARAMETERS To Be Collected METHOD NUMBER	PRESERVATION VOLUME METHOD REQUIRED	SAMPLE COLLECTED						
VOCs 8260C	HCL / 4 DEG. C 3 X 40 mL VOC vial	VOCs						
Hydrazine, MMH, UDMH Mod 8315 LC/MS/MS	Acetate Buffer 2 X 40 mL VOC vial	Hydrazine, MMH, UDMH						
NDMA Modified - EPA 521	4 DEG. C - no sunlight 2 X 1L Amber Glass	NDMA						
Formaldehyde SW-846 8315A  Metals (Ai, Cr, Fe, Mn, Mg, Na, As) 6010C/6020A	4 DEG. C 2 X 250mL Amber Glass  Nitric Acid / 4 DEG. C 1 X 250 mL Poly	Formaldehyde  METALS						
Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As) 6010C/6020A	Nitric Acid / 4 DEG. C 1 X 250 mL Poly	DISSOLVED METALS						
Hexavalent Chromium (Cr+6) 7199 Ammonia EPA 350.1	4 DEG. C - no headspace 1 X 250 mL Poly Sulfuric Acid / 4 DEG. C 1 X 250 mL Poly	Hexavalent Chromium (Cr+6)  Ammonia						
Ammonia EPA 350.1 Anions (Chloride & Sulfate) 300.0	4 DEG. C 1 X 250 ML Poly	Anions (Chloride & Sulfate)						
Specific Gravity SM2710F	4 DEG. C 1 X 500 mL Poly	Specific Gravity						
PFAS Modified - EPA 537	< 6 DEG. C 2 X 250 mL HDPE	PFAS						
PURGE OBSERVATIONS	LOCATION SKETCH	man						
PURGE WATER CONTAINERIZED YES NO GENERATED 1	- SAUNLIS Steel well	y y						
NOTES	1							
* = If 3 turbidity readings are < 5 NTU, then parameter is stable								
If Turbidity is > 25 NTU then collect a filtered metals sample								
1 July 1 Leves		wood.						
Sampled by: Sampler Signature:	Checked by: CTM	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						

V

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.								
FIELD DATA RECORD - LOW FLOW GROUNDWATER SAN	FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING							
PROJECT OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA WELL ID GV-540 COMPREHENSIVE ROUND								
SAMPLE ID OC- (5W -540 - 777) SITE	TYPE Superfund DATE \$12819							
TIME START 130 END 1900 JOB NUMBI	1336							
WATER LEVEL / PUMP SETTINGS  MEASUREMENT POINT  QC SAMPLE	PROTECTIVE PROTECTIVE							
COLLECTED ID (11) (13) (15) TOP OF PROTECTIVE CASING	CASING STICKUP (FROM GROUND)  ATT. DIFFERENCE  CASING WELL  CASING FT.							
INITIAL DEPTH TO WATER TO WATE	PID WELL							
FINAL DEPTH	AMBIENT AIR N/A PPM DIAMETER N.							
IOWATER FT. SCREEN LENGTH FT.	PID WELL MOUTH  N/A  PPM  WELL YES NO N/A  N/A  PPM  INTEGRITY: CAP							
DRAWDOWN VOLUME GAL. (final - initial x 0.16 {2-inch} or x 0.65 {4-inch})  RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED	PRESSURE TO PUMP N/A PSI COLLAR							
TOTAL VOL. PURGED (purge rate (milliliters per minute) x time duration (minutes) x 0.00026 gal/ml)	REFILL							
PURGE DATA	SET INC							
DEPTH TO PURGE RATE TEMP. SPEC. COND. pH (units)	DISS. 02 TURBIDITY(NTU) ORP/Eh (mV) SAMPLE							
(0.3 ft.) (100-400) (3%) (3%) (+/- 0.1 unit	) (10% > 0.5) (10% if >5 NTU)* (+/- 10 mV) DEPTH (ft.) COMMENTS							
1252 4.67 700 11.84 0366 6.13	243 7.31 -314 18							
1257 4 67 200 liso ous 6.05	0.99 5.60 3.0 18							
1302 9.67 200 [0.97 0.090 5,76	Jusy 5.52 15.2 Le							
1307 467 200 10,680 5,75	uss 462- 267 18							
1312 467 200 10.68 0.080 5.85	189 321 410 18							
1322 4.67 200 1036 02078 586	176 273 46 68							
1327 7.67 200 tosy 0.027 5.87	1182 289 48.1 18							
EQUIPMENT DOCUMENTATION								
TYPE OF PUMP TYPE OF TUBING	TYPE OF PUMP MATERIAL							
QED BLADDER     TEFLON OR TEFLON LINED     SIMCO BLADDER     X HIGH DENSITY POLYETHYLENE	POLYVINYL CHLORIDE STAINLESS STEEL							
X PER ISTALTIC LDPE (Dedicated)	X SILICON (Dedicated)							
ANALYTICAL PARAMETERS To Be Collected METHOD PI	RESERVATION VOLUME SAMPLE							
	ETHOD REQUIRED COLLECTED							
	CL / 4 DEG. C 3 X 40 mL VOC vial VOCs							
	cetate Buffer 2 X 40 mL VOC vial Hydrazine, MMH, UDMH  DEG. C - no sunlight 2 X 1L Amber Glass NDMA							
	DEG. C 2 X 250mL Amber Glass Formaldehyde							
which was the control of the control	tric Acid / 4 DEG. C 1 X 250 mL Poly METALS							
	tric Acid / 4 DEG. C         1 X 250 mL Poly         DISSOLVED METALS           DEG. C - no headspace         1 X 250 mL Poly         Hexavalent Chromium (Cr+6)							
Ammonia EPA 350.1 Si	alfuric Acid / 4 DEG. C 1 X 250 mL Poly Ammonia							
	DEG. C 1 X 125 mL Poly Anions (Chloride & Sulfate)  DEG. C 1 X 500 mL Poly Specific Gravity							
	6 DEG. C 2 X 250 mL HDPE PFAS							
PURGE OB SERVATIONS	LOCATION SKETCH COR S. Je MAD							
PURGE WATER CONTAINERIZED YES NO GENERATED	6C-GW-540-Dup- Duplicate 6C-GW-540-MS - MATRY SPK 5C-GW-540-MSO - MARRY DUP.							
NOTES	66-Cil - Galance - Maria Car							
* = If 3 turb lidity readings are < 5 NTU, then parameter is stable  If Turbidity is > 25 NTU then collect a filtered metals sample	octor sylvering - make you							
· · · ·	3C-GM - 340-MM							
mochelle Low	<b>WOOO.</b>							
Sampled by: Sampler Signature: WWW.	necked by:							

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC. FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING									
PROJECT OLIN CHEMICAL S	SUPERFUND SITE, V	WILMINGTON	I, MA	WE	LL ID GW	-107		]	DMPREHENSIVE ROUND
	SAMPLE ID OC-GW-101-XXX					TE TYPE Superfund			DATE 5/28/2019
TIME START 1695		325		JOB NUMBE		6107190016		] В	SOTTLE TIME 1813
WATER LEVEL / PUMP SETT	rings	MEASURE	MENT POINT						· · · · · · · · · · · · · · · · · · ·
QC SAMPLE COLLECTED ID			OF WELL RISER OF PROTECTIVE ER	CASING	PROTECTIVE CASING STIC (FROM GROL	KUP 1	9 FT.	PROTECTI CASING / V DIFFEREN	WELL A O
INITIAL DEPTH TO WATER 11.3	6 FT.	WELL DEF	PTH 18.7	FT.	PID AMBIENT AIR	N/A	PPM	WELL DIAMETER	3,0 IN.
FINAL DEPTH TO WATER	Y FT.	SCREEN LENGTH	11.5	FT.	PID WELL MOUTH	N/A	PPM	WELL INTEGRITY	YES NO N/A
DRAWDOWN VOLUME (final - initial x 0.16 {2-inch} o	UAL.		DF DRAWDOWN NOTAL VOLUME PU		PRESSURE TO PUMP	N/A	PSI		CASING X
TOTAL VOL.	GAL.	0	.003		REFILL TIMER	N/A	SEC.	DISCHARG	
(purge rate (milliliters per min	nute) x time duration (	(minutes) x 0.	00026 gal/ml)		SETTING			SETTING	
PURGE DATA  DEPTH TO P	URGE RATE   T	EMP.	SPEC. COND.		DISS. O2	T	T		
TIME WATER (ft.) (0.3 ft.)	(ml/min) (d (100-400)	leg. C) (3%)	(μS/cm) (3%)	pH (units) (+/- 0.1 unit)	(mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
	150 10.3	-	3,540	6.19	0,9)	8.39	53.3	"15"	
	50 10.5		1.503 .476	6.19	0.78	5.84	50.6	1	
	250 10.		-444	6.16	0.75	6.89	41.7		
4	150 10.	V	<u>434</u>	6.15	1.0)	6.66	38.2		
			,430	6.13	1.44	4.35	35.)		
	150 10.0		.418	6.14	1.54	5.20	33.3		
	250 10,0		.469	6.14	1.30	3.65	28.8		
	250 10.5		358	6.13	1.17	2.10	24.9		
	250- 10.0	,	.388	6.12	1.06	1.69	23.0		
	150 10.7 150 11.		3.384	6.12	1.09	1.62	32.8	1	
EQUIPMENT DOCUMENTATI		00 (	2,201	6,10	1.00	1018	0,1	*	
TYPE OF PUMP		OF TUBING			TYPE OF	PUMP MATERIAL			
QED BLADDER			EFLON LINED			LYVINYL CHLORIDE			
SIMCO BLADDER  X PERISTALTIC		IIGH DENSIT DPE (Dedicat	Y POLYETHYLEN	E		AINLESS STEEL ICON (Dedicated)	. ~ 1 1 0 7	/28/2019	120 1000
ANALYTICAL PARAMETERS		DI L (Dedical	leu)			ICON (Dedicated)	NEW 05	12012019	per app
To Be Collected		METH(			ESERVATION THOD	VOLUME REQUIRED		SAMPLE COLLECTED	
vocs		8260C		НС	L/4 DEG. C	3 X 40 mL V	OC vial	VOCs	
Hydrazine, MMH, UDMH			315 LC/MS/MS		etate Buffer	2 X 40 mL V		==	ine, MMH, UDMH
NDMA Formaldehyde			ed - EPA 521 16 8315A		EG. C - no sunl EG. C		er Glass Amber Glass	NDMA	dehyde
Metals (Al, Cr, Fe, Mn, M	lg, Na, As)		/6020A		ic Acid / 4 DEG			METAL	
Dissolved Metals (Al, Cr,	Dissolved Metals (Al, Cr, Fe, Mn, Mg, Na, As) 6010C/6020A				ic Acid / 4 DEG	. C 1 X 250 mL	Poly	DISSO	LVED METALS
Hexavalent Chromium (C	Cr+6)	7199	FO.4		EG. C - no heads			==	alent Chromium (Cr+6)
Ammonia Anions (Chloride & Sulfa	te)	EPA 3:	50.1		furic Acid / 4 DE EG. C	G. C 1 X 250 mL 1 X 125 mL	5	Ammor	(Chloride & Sulfate)
Specific Gravity	,	SM271	OF		EG. C	1 X 500 mL	none of the	Specific	
PFAS		Modifie	ed - EPA 537	< 6	DEG. C	2 X 250 mL	HDPE	PFAS	
PURGE OBSERVATIONS					LOCATION S	KETCH			
PURGE WATER CONTAINERIZED YES		ER OF GALL RATED	ONS 4.0						
NOTES									
* = If 3 turbidity readings are	30%								
If Turbidity is > 25 NTU then of	collect a filtered m	etals sampl	e						
									wood.
lan/harai	AVC4 N			200					********
Sampled by: INDES JUST Sampler Signature:	2			Che	ecked by:	Im			,

		ORD - LO		UTIONS, INC. ROUNDWAT	ER SAM	IPLING				
PROJECT		AL SUPERFUND	WWW 0 503,000 000 00	MAT 15 100 15 100 100 100 100 100 100 100 1		and an annual source	N-305		]	COMPREHENSIVE ROUND
SAMPLE ID	MISID OC-CIT 205 XXX					TYPE	Superfund		]	DATE 5/29/2019
TIME	START 075		D 1055		JOB NUMBE		6107190016		]	BOTTLE TIME 10:14
	VEL / PUMP S			JREMENT POINT	JOB NOWBE		0107130010			BOTTLE TIME
QC SAN	THE RESIDENCE MANAGEMENT AND THE	/	X TO	OP OF WELL RISER OP OF PROTECTIVE THER	CASING	PROTECTIVE CASING STIC (FROM GROU	KUP	FT.	PROTE CASING DIFFER	G/WELL TO DO
INITIAL DE		94 1	T. WELL (TOR)	DEPTH 18.6	FT.	PID AMBIENT AIR	N/A	PPM	WELL DIAMET	TER 2 IN.
FINAL DEI TO WA		98 ,	T. SCREE	N N	FT.	PID WELL MOUTH	N/A	PPM	WELL	YES NO N/A
DRAWDO VOLU (final - ir	IME U	04 G. h) or x 0.65 {4-inc	AL. RATI	O OF DRAWDOWN TOTAL VOLUME PU	VOLUME	PRESSURE TO PUMP	N/A	PSI	]	CASINGX LOCKEDX COLLAR _X
TOTAL V	/OL. <i>Q</i>	5	AL.	0.004		REFILL TIMER	N/A	SEC.	DISCHA	Market Commence of the Commenc
100 0000000	The second secon	minute) x time du		x 0.00026 gal/ml)		SETTING	IWA	SEC.	SETTIN	
PURGE DA		Loubos bars	75115					Т		
TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (μS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
0810	1		/	/	/		/	/	/	BEGIN PURGE-HEAVY
1						-				OXIDIZED GRANCE
						-/-		<del>-/-</del>		PURCH ~ 2.5 GALLAS
0835		/			<del>                                     </del>	<del>                                     </del>		<del>                                     </del>		PURCE CLEARS-CONNECT
0840	/	/	/	/	/	/		/	/	CELL
0845	5.98	200	11.38	0.184	6.25	0.65	368	9.6	16	
0850	5.98	200	11.43	0.181	6.31	0.65	722	-9.5		
0822	5.98	200	11.43	0.179	6.30	0.76	>1000	-10.5		NTV OUT OF RANGE
0960	5.98	200	11.47	0.176	6.28	1.24	578	-20.1		
0905	5.98	200	11.38	0.168	6.31	2.02	346	-23.9		
	T DOCUMENT		11.47	0.165	6.31	1.83	all	- 30.6		
	F PUMP		TYPE OF TUBIN			90	PUMP MATERIAL			
	D BLADDER MCO BLADDER			R TEFLON LINED SITY POLYETHYLEN	F		LYVINYL CHLORIDE AINLESS STEEL			
	RISTALTIC		LDPE (Dec		-	X SIL	ICON (Dedicated)	JEW - U	5/29/2	uig PERGAPP
ANALYTICATO Be Collect	AL PARAMETE	RS		THOD MBER		RESERVATION ETHOD	VOLUME REQUIRED		SAMPLE COLLECTED	
Thvo	Oo.		826			CL/4 DEG. C			Thvo	
	os Irazine, MMH, UD	мн		d 8315 LC/MS/MS		etate Buffer	3 X 40 mL V 2 X 40 mL V		=	Irazine, MMH, UDMH
NDN	MA		Мо	dified - EPA 521	4 [	DEG. C - no sun	light 2 X 1L Amb	er Glass	□ NDI	MA
	maldehyde	a Ma Na As)		-846 8315A		DEG. C		Amber Glass	For	maldehyde
Metals (AI, Cr, Fe, Mn, Mg, Na, As) 6010C/6020A  Dissolved Metals (AI, Cr, Fe, Mn, Mg, Na, As) 6010C/6020A					Nitric Acid / 4 DEG. C 1 X 250 mL Poly Nitric Acid / 4 DEG. C 1 X 250 mL Poly			=	SOLVED METALS	
	avalent Chromiu	m (Cr+6)	719			EG. C - no heads		Poly	=	ravalent Chromium (Cr+6)
Anic	monia ons (Chloride & S	ulfate)	EP.	A 350.1		Ilfuric Acid / 4 DE DEG. C	EG. C 1 X 250 mL 1 X 125 mL		=	monia ons (Chloride & Sulfate)
	cific Gravity	unate)		2710F		DEG. C	1 X 500 mL	(5)	_	cific Gravity
¥ PF/	AS		Мо	dified - EPA 537	< 6	DEG. C	2 X 250 mL	HDPE	PF.	AS
ALL CONTRACTOR OF CHARACTER CONTRACTOR	SERVATIONS			. 500 - 54054 5405	T	LOCATION	SKETCH			
PURGE WA'		] NO	NUMBER OF G	8.5						
NOTES										
		are < 5 NTU, the								
If Turbidity	is > 25 NTU th	en collect a filte	ered metals sar	nple						
								4		Wood
	IAN DESI	ARLAIS			Ch	ecked by:	CTM	****		*******
Sampler Sigr	nature:	762					1 300000			

The same states are				OLUTIONS, INC.  GROUNDWA	TER SAMI	PLING				
PROJECT	JECT OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA					WELL ID GW-305				COMPREHENSIVE ROUND
SAMPLE ID	EID OC-GW-305-XX			SITE "	E TYPE Superfund				DATE 05/29/249	
TIME	START 075	CO ENI	0 1055		JOB NUMBE	R	6107190016	3		BOTTLE TIME 10:14
WATER LE	VEL / PUMP SE	ETTINGS	ME	ASUREMENT POINT						
QC SAN COLLEC	MPLE CTED ID		X	TOP OF WELL RISEF TOP OF PROTECTIVE OTHER		PROTECTIVE CASING STIC (FROM GROU	KUP FILE	H FT.	PROTE( CASING DIFFER	A 76
INITIAL DEI		.94 F	T. WE	LL DEPTH 18	O FT.	PID AMBIENT AIR	N/A	PPM	WELL	TER 2 IN.
FINAL DEI		.98 F	T. SCI	REEN 10	FT.	PID WELL MOUTH	N/A	РРМ	WELL INTEGR	YES NO N/A
DRAWDO VOLU (final - in			AL. R	ATIO OF DRAWDOWN	N VOLUME	PRESSURE TO PUMP	N/A	PSI		CASING 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
TOTAL V	/OL. <	25		0.004		REFILL			DISCHA	ARGE
PUR( (purge r	u		AL. Iration (minute	es) x 0.00026 gal/ml)		TIMER SETTING	N/A	SEC.	SETTIN	G N/A SEC.
PURGE DA	ATA									
TIME	DEPTH TO WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPLE DEPTH (ft.)	COMMENTS
0915	5.98	200	11.46	0.162	6.31	1.48	124	-23.7	16	NEW CARBUY (5 GALGS)
0920	5,98	200	11.48	0.161	6.30	1.30	116	-22.2	1	
0925	5.98	200	11.44	0.159	6.30	1.15	95.5	-27.3		
0930	5.98	200	11.47	0.158	6.29	0.97	44.4	-34.4	-	
0940	5.98	200	11.49	0.158	6.29	0.95	43.1	-35.2		
0945	5.98	200	11.49	0.157	6.30	0.93	46.4	-46.4		
0950	5.98	200	11.52	0.156	6.30	0.87	44.2	-47.6		
0955	5.98	200	11.58	0.156	6.31	0.84	40.3	-47.6		
10:00	5.98	200	11.52	0.157	6.31	0.33	41.1	-27.5		-MAURA ORP?
10:05	5.98	200	11.53	0.156	6.31	0.78	44.2	-24.7		
10:10	5.98	200	11.53	0.157	6.32	0.75	45.8	-26.2	¥	SAMPLE & 10:14
	NT DOCUMENT	ATION	TYPE OF TU	IBING		TYPE OF	PUMP MATERIAL			
	<u>F PUMP</u> D BLADDER			N OR TEFLON LINED			LYVINYL CHLORID	Ε		
SIN	MCO BLADDER			ENSITY POLYETHYLE	ENE	ST	AINLESS STEEL	,	/	TANA ANDR
X PEF	RISTALTIC		LDPE (	Dedicated)		X SIL	ICON (Dedicated)	NEW 05/	29/2019	PER CAPP
ANALYTIC To Be Collect	AL PARAMETE	RS		METHOD NUMBER		ESERVATION	VOLUME REQUIRE	<u>D</u>	SAMPLE COLLECTED	2
Пуо	Cs			8260C	нс	L/4 DEG. C	3 X 40 mL	VOC vial	Пуо	Cs
	drazine, MMH, UD	МН		Mod 8315 LC/MS/MS		etate Buffer	2 X 40 mL	VOC vial		drazine, MMH, UDMH
NDI				Modified - EPA 521		EG. C - no sun	-		NDI	
	maldehyde tals (Al, Cr, Fe, Mr	n Mn Na As)		SW-846 8315A 6010C/6020A		EG. C ric Acid / 4 DEG		Amber Glass		maldehyde TALS
	solved Metals (Al,		Na, As)	6010C/6020A		ric Acid / 4 DEG				SOLVED METALS
	xavalent Chromius	m (Cr+6)		7199		EG. C - no heads				xavalent Chromium (Cr+6)
	monia ons (Chloride & S	ulfata)		EPA 350.1 300.0		furic Acid / 4 DE EG. C	EG. C 1 X 250 m 1 X 125 m			monia ons (Chloride & Sulfate)
	ecific Gravity	uliale)		SM2710F		EG. C	1 X 500 m			ecific Gravity
□ PF	AS			Modified - EPA 537	< 6	DEG. C	2 X 250 m	LHDPE	<b>≯</b> PF	AS
PURGE OF	BSERVATIONS					LOCATION	SKETCH			
PURGE WA		] NO	NUMBER O GENERATE	F GALLONS 8.5						
NOTES										
	oidity readings									
If Turbidity	/ is > 25 NTU th	en collect a filt	erea metals	sample						wood.
										WOOD.
Sampled by:	I AN DES	LABLAS			Ch	ecked by:	ארב			
	gnature:	162					- 1		_	

WOOD ENVIRONMENT &				ER SAM	PLING				
PROJECT OLIN CHEMICAL	ECT OLIN CHEMICAL SUPERFUND SITE, WILMINGTON, MA					WELL ID GW-307			COMPREHENSIVE ROUND,
SAMPLE ID OC-GW	1-307-	XXX		SITE		Superfund		j	DATE 5/29/2019
TIME START 1240	END	٠, ٦, ٦		JOB NUMBE		6107190016		]	BOTTLE TIME 13:18
WATER LEVEL / PUMP SET			REMENT POINT	JOB NOMBE	n	010/190010		j	BOTTLE TIME 1771G
QC SAMPLE COLLECTED ID	TINGS	X TO	P OF WELL RISER P OF PROTECTIVE HER	CASING	PROTECTIVE CASING STIC (FROM GROU	KUP 2 10	FT.	CASI	TECTIVE ING/WELL FERENCE -0.11 FT.
INITIAL DEPTH TO WATER 6.0	)3 F	T. WELL D	19.49	FT.	PID AMBIENT AIR	N/A	PPM	WEL	L METER 2 IN.
FINAL DEPTH 8.0	7 F	T. SCREE	N 10		PID WELL			, ] WEL	L YES NO N/A
	326 GA		O OF DRAWDOWN		MOUTH PRESSURE	N/A	PPM	] INTE	CASING X
(final - initial x 0.16 {2-inch}	ACRES NATIONAL STREET	h}) TO	TOTAL VOLUME PU	IRGED	TO PUMP	N/A	PSI	] ] disc	COLLAR
PURGED 3.0 (purge rate (milliliters per mi	G/		0.		TIMER SETTING	N/A	SEC.	TIME SET	ER N/A SEC.
PURGE DATA									
TIME DEPTH TO F WATER (ft.) (0.3 ft.)	PURGE RATE (ml/min) (100-400)	TEMP. (deg. C) (3%)	SPEC. COND. (µS/cm) (3%)	pH (units) (+/- 0.1 unit)	DISS. O2 (mg/L) (10% > 0.5)	TURBIDITY(NTU) (10% if >5 NTU)*	ORP/Eh (mV) (+/- 10 mV)	SAMPL DEPTH (	
1220 7.75	175	9.27	0,392	6.76	2.94	18.6	-76.1	M17	BEGIN PURCE
1230 8.07	175	8.99	0.387	6.99	1.34	13.7	-102.9	1	
	135	9.03	0.387	7.08	1.13	18.8	-112.7		/
	25	9.06	0.397	7.13	1.09	31.8	-102.		NTU CHANCE
	25	9.04	0.419	7.15	0.97	34.9	-78.8		
	25	8.97	0.428	7.16	0.93	37.2	-107.2		SLOWER RATE
10 10 11	100	9.05	0.433	7.16	1.16	28.3	-110.6		SWEEK KAIL
1000 -0 100 000 00 000 000 000 000 000 0	100	9.05	0.462	7.18	1.67	26.2	-82.9		
12/4 6	100	9.08	0.462	7.19	1.55	23.0	~91.9		
1315 8.07	160	9.64	0.463	7.19	1.42	24.1	-97.3		
1318		/		7			/	×	SAMPLIE
EQUIPMENT DOCUMENTAT	ΓΙΟΝ					<b>.</b>			
TYPE OF PUMP		TYPE OF TUBIN	<u>G</u>		TYPE OF	PUMP MATERIAL			
QED BLADDER SIMCO BLADDER	]		R TEFLON LINED SITY POLYETHYLEN	_		LYVINYL CHLORIDE AINLESS STEEL			
X PERISTALTIC	ı I	X HIGH DENS					VEW OF	129/20	A PERGAPP
ANALYTICAL PARAMETERS To Be Collected	 S		rhod	PR	ESERVATION	VOLUME	4000 05	SAMPL	
		NUM	MBER	ME	THOD	REQUIRED		COLLECT	<u>TED</u>
VOCs		826	OC	нс	L/4 DEG. C	3 X 40 mL \	OC vial	中	VOCs
Hydrazine, MMH, UDMI	Н		18315 LC/MS/MS		etate Buffer	2 X 40 mL \		=	Hydrazine, MMH, UDMH
NDMA Formaldehyde			lified - EPA 521 -846 8315A		)EG. C - no sunl )EG. C	-	er Glass Amber Glass	=	NDMA Formaldehyde
Metals (Al, Cr, Fe, Mn, M	Mg, Na, As)		0C/6020A		ric Acid / 4 DEG			=	METALS
Dissolved Metals (Al, Cr			0C/6020A		ric Acid / 4 DEG			_	DISSOLVED METALS
Hexavalent Chromium (	(Cr+6)	719	9 \ 350.1		EG. C - no heads furic Acid / 4 DE		(8)		Hexavalent Chromium (Cr+6) Ammonia
Ammonia  Anions (Chloride & Sulfa	ate)	300			DEG. C	G. C 1 X 250 mL 1 X 125 mL			Anions (Chloride & Sulfate)
Specific Gravity	2127		2710F		EG. C	1 X 500 mL			Specific Gravity
PFAS		Mod	lified - EPA 537	< 6	DEG. C	2 X 250 mL	HDPE		PFAS
PURGE OBSERVATIONS					LOCATION S	KETCH			
PURGE WATER CONTAINERIZED YES		NUMBER OF GA GENERATED	^3.0						
NOTES									
* = If 3 turbidity readings are	e < 5 NTU, the	n parameter is	stable						
If Turbidity is > 25 NTU then	collect a filte	red metals san	nple						_
				590					WOOD
									WOOD.
Sampled by: Sampler Signature:	DESJARU	24		Ch	ecked by: 🔑	TM			



## ATTACHMENT B DATA VALIDATION REPORT



# FINAL DATA VALIDATION REPORT REMEDIAL INVESTIGATION

# OPERABLE UNIT 3 PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) GROUNDWATER SAMPLING EVENT

OLIN CHEMICAL SUPERFUND SITE
51 EAMES STREET
WILMINGTON, MASSACHUSETTS

Prepared for:

**Olin Corporation** 

3855 North Ocoee Street; Suite 200 Cleveland, Tennessee 37312

Prepared by:

Wood Environment & Infrastructure Solutions, Inc. 271 Mill Road

Chelmsford, Massachusetts 01824

**September 27, 2019** 

Project No. 6107190016.001.10



## **FINAL DATA VALIDATION REPORT REMEDIAL INVESTIGATION**

## **OPERABLE UNIT 3**

## PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) **GROUNDWATER SAMPLING EVENT**

**OLIN CHEMICAL SUPERFUND SITE 51 EAMES STREET WILMINGTON, MASSACHUSETTS** 

**Prepared for:** 

**Olin Corporation** 

3855 North Ocoee Street; Suite 200 **Cleveland, Tennessee 37312** 

Prepared by:

**Wood Environment & Infrastructure Solutions, Inc.** 

271 Mill Road

Chelmsford, Massachusetts 01824

**September 27, 2019** 

Project No. 6107190016.001.10

Elizabeth Bowen

Project Manager

**Principal Scientist** 



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2.0	PFAS COMPOUNDS	2-1
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- Table 2 Final Results Summary
- Table 3 Data Validation Action Summary



## LIST OF ACRONYMS AND ABBREVIATIONS

%D % Difference

HT Holding Time

IS-L Internal Standard response below limit

J estimated value

LCS Laboratory Control Sample

LCSD Laboratory Control Sample Duplicate

MassDEP Massachusetts Department of Environmental Protection

mls milliliters MS Matrix Spike

MSD Matrix Spike Duplicate
MS-H Matrix Spike recovery high

PFAS Per- and Polyfluoroalkyl Substances

PFBS Perfluorobutanesulfonic acid
PFDoA Perfluorododecanoic acid
PFHpA Perfluoroheptanoic acid
PFHxA Perfluorohexanoic acid
PFHxS Perfluorohexanesulfonic acid

PFNA Perfluorononanoic acid PFTeDA Perfluorotetradecanoic acid

QAPP Quality Assurance Project Plan

SDG Sample Delivery Group

U Non-detect

UJ Reporting Limit Qualified as Estimated

USEPA United States Environmental Protection Agency

Wood Wood Environment & Infrastructure Solutions, Inc.



## 1.0 INTRODUCTION

Groundwater samples were collected by Wood Environment & Infrastructure Solutions, Inc. (Wood) at the Olin Chemical Superfund Site in May 2019. The sampling and analysis approach for this groundwater event was based on specifications detailed in the Addendum I Per- and Polyfluoroalkyl Substances (PFAS) Remedial Investigation/Feasibility Study Work Plan Project Operations Plan Volume III-B Quality Assurance Project Plan (Wood, 2019a) and Interim Guidance on Sampling and Analysis for PFAS at Disposal Sites Regulated under the Massachusetts Contingency Plan (Massachusetts Department of Environmental Protection [MassDEP], 2018). Samples were analyzed using the following analytical method:

Laboratory	Parameter	Analytical Method	Validation Level
Eurofins – Lancaster, PA	PFAS	United States Environmental Protection Agency (USEPA) Method 537 Version 1.1 Modified (PFAS by LC-MS-MS)	10% Stage 4/ 90% Stage 2A

The PFAS groundwater samples were collected from May 28 and May 29, 2019. Sample OC-MP-1#1-XXX was re-extracted and reanalyzed because the initial laboratory analysis was done at a high dilution and PFAS was not detected. The sample was reanalyzed at a lower dilution to obtain detection limits that were closer to achieving project data quality objectives. A summary of samples included in this data validation report is presented in **Table 1**. Analytical data packages were reviewed in accordance with the Olin Chemical Superfund Site Final Remedial Investigation/Feasibility Study Work Plan Quality Assurance Project Plan (QAPP) [Wood, 2019b] and specification in the QAPP Addendum I [Wood, 2019a]. Sample data were validated using staged data validation (USEPA, 2009) identified in Region 1 EPA-New England Environmental Data Review Program Guidance (USEPA, 2018), the general procedures identified in USEPA National Functional Guidelines (USEPA, 2017) and the judgment of the validator as applicable to the modified Method 537 procedure and method performance criteria were developed for this project as indicated in the QAPP Addendum I.

Final validated sample results are presented in **Table 2**. Documentation of data validation actions is presented in **Table 3**. **Table 3** is a summary of laboratory results that have been qualified (data validation has resulted in revisions to the laboratory result). An index of the qualification reason codes is presented in **Table 3**.





## **2.0 PFAS**

Samples were analyzed for 14 PFAS compounds identified in the QAPP Addendum I. The following items were reviewed during validation:

- Data Completeness
   Holding Times (HT) and Preservation
- \* Blanks
- Instrument Tunes
- \* Initial Calibration Standards
- Continuing Calibration Standards
- \* Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)
   Matrix Spikes (MS)/Matrix Spike Duplicates (MSD)
- \* Field Duplicates

Surrogate Recovery/Internal Standards

**Detection Limits** 

- \* Target Compound Identification
- \* Sample Result Verification/Electronic Database Verification
- Raw data verification and calculation checks
- \* = indicates that criteria were met for this parameter

Except for the validation actions noted below, sample results are interpreted to be usable as reported by the laboratory. A summary of final results is presented in **Table 2**. A summary of data validation actions is presented in **Table 3**.

## 2.1 Holding Times and Preservation

## Sample Delivery Group (SDG) TAO20 / Group 2052690

A reduced volume (2.5 milliliters [mls]) of sample OC-MP-1#1-XXX was extracted by the lab due to matrix interferences which resulted in an effective 100X dilution of the sample. PFAS compounds were reported as not detected with elevated reporting limits in this initial analysis. Due to this excessive dilution, the Olin Corporation requested sample OC-MP-1#1-XXX be re-extracted and analyzed. The sample was re-extracted at 10 mls which resulted in an effective 25X dilution of the sample. This re-extraction was performed eight days past the 14 day extraction hold time specified in the method. PFAS compounds were reported as not detected in the second analysis that was extracted outside of hold time. Results from the second analysis were reported in the final data set with elevated reporting limits that were qualified estimated (UJ).





A summary of holding time qualification actions is presented in **Table 3** with results being assigned a validation qualifier reason code of HT for sample holding times.

## 2.2 MS/MSD

## **SDG TAO18 / Group 2046067**

The MS and/or MSD associated with sample OC-GW-54D-XXX and its field duplicate OC-GW-54D-DUP had percent recoveries above the upper quality control limits for perfluorohexanoic acid (PFHxA)(144%/ 135%), perfluoroheptanoic acid (PFHpA) (141%/144%), perfluorohexanesulfonic acid (PFHxS) (MSD 139%), perfluorononanoic acid (PFNA) (142%/144%), perfluorododecanoic acid (PFDoA) (139%/140%), and perfluorotetradecanoic acid (PFTeDA) (MS 145%).

Detections of PFHxA, PFHpA and PFNA in samples OC-GW-54D-XXX and OC-GW-54D-DUP were qualified as estimated (J) due to the potential high bias. PFHxS, PFDoA and PFTeDA were nondetect in the associated samples and not impacted by the potential high bias and no qualifications were necessary. A summary of MS/MSD qualification actions is presented in **Table 3** for PFAS with results being assigned a validation qualifier reason code of MS-H.

### 2.3 Internal Standards

## **SDG TAO18 / Group 2046067**

The percent difference (%D) between the internal standard I13C3-PFBA in sample OC-MP-1#4-XXX and the initial calibration was outside of the control limit of 50 at -53 %D. The result for perfluorobutanesulfonic acid (PFBS) in sample OC-MP-1#4-XXX was qualified as estimated (J) and assigned a reason code of IS-L in **Table 3**.

## 2.4 Detection Limits

## **SDG TAO20 / Group 2052690**

Sample OC-MP-1#1-XXX was analyzed at dilution due to matrix interferences (see discussion in Section 2.1 above). Compounds reported as not detected in diluted sample have elevated detection limits. Sample quantitation limits for the sample are presented in **Table 2.** 

## 2.5 Data Usability

Except for the validation actions noted above, sample results are interpreted to be usable as reported by the laboratory. There were no results rejected during the validation review of the data contained in this report. Of the 196 results reported, 21 results (11%) were qualified as estimated due to hold time exceedances, low internal standard response, and/or high matrix spike recoveries. PFAS compounds were not detected in the laboratory blanks and the laboratory control spikes were with in QC limits specified in the QAPP, indicating good precision and accuracy for the data set.





## 3.0 REFERENCES

- MassDEP, 2018. Fact Sheet Interim Guidance on Sampling and Analysis for PFAS at Disposal Sites Regulated under the Massachusetts Contingency Plan; June 19.
- USEPA, 2009. "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use"; Office of Solid Waste and Emergency Response; EPA-540-R-08-005; January 2009.
- USEPA, 2017. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Superfund Methods Data Review"; Office of Superfund Remediation and Technology Innovation; EPA-540-/R-2017-002; January 2017.
- USEPA, 2018. "Region I EPA-New England Environmental Data Review Program Guidance"; Office of Environmental Measurement and Evaluation (OEME); June 2018.
- Wood, 2019a. "Addendum I Per- and Polyfluoroalkyl Substances (PFAS) Final Remedial Investigation/Feasibility Study Project Operations Plan"; Volume III-B Quality Assurance Project Plan; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; May, 2019.
- Wood, 2019b. "Final Remedial Investigation/Feasibility Study Project Operations Plan"; Volume III-B Quality Assurance Project Plan; Olin Chemical Superfund Site; 51 Eames Street; Wilmington, MA; May, 2019.

Data validation was completed by:

Elizabeth Penta

## **TABLES**

					Analys	Lab ID	Lancast EPA 537.1 MOD
					Allalys		
Lab Sample	Laboratory Group					Fraction	N N
Delivery Group	Number	Location	Field Sample ID	Media	Sample Date	QC Code	Param_Count
TAO18	2046391	GW-10DR	OC-GW-10DR-XXX	GW	5/29/2019	FS	14
TAO18	2046391	GW-305	OC-GW-305-XXX	GW	5/29/2019	FS	14
TAO18	2046391	GW-307	OC-GW-307-XXX	GW	5/29/2019	FS	14
TAO20	2052690	MP-1 #01	OC-MP-1#1-XXX	GW	5/29/2019	FS	14
TAO18	2046391	MP-1 #04	OC-MP-1#4-XXX	GW	5/29/2019	FS	14
TAO18	2046391	MP-1 #14	OC-MP-1#14-XXX	GW	5/29/2019	FS	14
TAO18	2046067	BR-1	OC-BR-1-XXX	GW	5/28/2019	FS	14
TAO18	2046067	QC	OC-FB-052819	BW	5/28/2019	FB	14
TAO18	2046067	GW-101	OC-GW-101-XXX	GW	5/28/2019	FS	14
TAO18	2046067	GW-15	OC-GW-15-XXX	GW	5/28/2019	FS	14
TAO18	2046067	GW-16R	OC-GW-16R-XXX	GW	5/28/2019	FS	14
TAO18	2046067	GW-32D	OC-GW-32D-XXX	GW	5/28/2019	FS	14
TAO18	2046067	GW-32S	OC-GW-32S-XXX	GW	5/28/2019	FS	14
TAO18	2046067	GW-54D	OC-GW-54D-DUP	GW	5/28/2019	FD	14
TAO18	2046067	GW-54D	OC-GW-54D-XXX	GW	5/28/2019	FS	14

Created by: KMS 7/25/19

Checked by: EAP 8/14/19

Notes: Lancast= Eurofins Lancaster Laboratories Environmental, LLC.

BW = Blank water

FB = Field Blank

FD = Field Duplicate

FS = Field Sample

GW = Groundwater

Fraction = N- Normal

			Location	2046067	2046067	2046067	2046067	2046067
		Lab Sample Deliv			GW-101	GW-15	GW-16R	GW-32D
		Field Sa	ample Date	5/28/2019	5/28/2019	5/28/2019	5/28/2019	5/28/2019
		Field	Sample ID	OC-BR-1-XXX	OC-GW-101-XXX	OC-GW-15-XXX	OC-GW-16R-XXX	OC-GW-32D-XXX
			QC Code	FS	FS	FS	FS	FS
Method	Fraction	Parameter	Units	Result Qualifier				
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ng/l	2.7 U	2.5 U	2.7 U	2.6 U	1.8 J
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ng/l	2.7 U	2.5 U	2.7 U	2.6 U	2.7 U
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	ng/l	0.78 J	0.76 J	0.99	0.83 J	0.87 J
EPA 537.1 MOD	Ν	Perfluorodecanoic acid (PFDA)	ng/l	1.8 U	1.7 U	1.8 U	1.7 U	1.8 U
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	ng/l	1.8 U	1.7 U	1.8 U	1.7 U	1.8 U
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	ng/l	2.1	2.3	0.52 J	0.89	1.4
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	ng/l	1.1 J	1.7 U	0.44 J	1.7 U	0.65 J
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	ng/l	3.4	5.3	0.68 J	1.6 J	1.8 J
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	ng/l	1.1 J	1.3 J	1.8 U	0.55 J	0.97 J
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	ng/l	6.4	5.1	3.5	2	8.1
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	ng/l	8.4	5.2	2.5	3.2	5
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	ng/l	0.91 U	0.84 U	0.9 U	0.86 U	0.9 U
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	ng/l	0.91 U	0.84 U	0.9 U	0.86 U	0.9 U
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	ng/l	1.8 U	1.7 U	1.8 U	1.7 U	1.8 U

#### Notes:

FS = field sample; FB = field blank
U = Not detected, value is the reporting limit
J = Value is estimated
ng/l = nanograms per liter

			Location	2046067	2046067	2046067	2046067
		Lab Sample Deli	very Group	GW-32S	GW-54D	GW-54D	QC
			ample Date		5/28/2019	5/28/2019	5/28/2019
		Field	Sample ID	OC-GW-32S-XXX	OC-GW-54D-DUP	OC-GW-54D-XXX	OC-FB-052819
			QC Code	FS	FD	FS	FB
Method	Fraction	Parameter	Units	Result Qualifier	Result Qualifier	Result Qualifier	Result Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ng/l	2.7 U	2.7 U	2.7 U	2.6 U
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ng/l	2.7 U	2.7 U	2.7 U	2.6 U
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	ng/l	0.91 U	0.49 J	0.54 J	0.87 U
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	ng/l	1.8 U	1.8 U	1.8 U	1.7 U
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	ng/l	1.8 U	1.8 U	1.8 U	1.7 U
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	ng/l	0.45 J	1.1 J	1.1 J	0.87 U
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	ng/l	1.8 U	1.8 U	1.8 U	1.7 U
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	ng/l	1.8 U	1.8 J	1.7 J	1.7 U
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	ng/l	1.8 U	1 J	1.1 J	1.7 U
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	ng/l	0.51 J	1.5 J	1.6 J	1.7 U
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	ng/l	1.7	2.2	2.4	0.87 U
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	ng/l	0.91 U	0.89 U	0.89 U	0.87 U
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	ng/l	0.91 U	0.89 U	0.89 U	0.87 U
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	ng/l	1.8 U	1.8 U	1.8 U	1.7 U

#### Notes:

FS = field sample; FB = field blank
U = Not detected, value is the reporting limit
J = Value is estimated
ng/l = nanograms per liter

			Location	2046	6391	2046391	2046	391	2046	6391
		Lab Sample Del	ivery Group	GW-	10DR	GW-305	GW-	307	MP-	1 #04
		Field S	Sample Date	5/29/	/2019	5/29/2019	5/29/	2019	5/29/	2019
		Field	d Sample ID	OC-GW-1	I0DR-XXX	OC-GW-305-XXX	OC-GW-	307-XXX	OC-MP-	1#4-XXX
			QC Code	F	S	FS	F	S	F	S
Method	Fraction	Parameter	Units	Result	Qualifier	Result Qualifier	Result	Qualifier	Result	Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ng/l	2.7	U	2.6 U	2.7	U	2.7	U
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ng/l	2.7	U	2.6 U	2.7	U	2.7	U
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	ng/l	0.7	J	0.55 J	1.2		0.42	J
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	ng/l	1.8	U	1.7 U	1.8	U	1.8	U
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	ng/l	1.8	C	1.7 U	1.8	U	1.8	U
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	ng/l	1.8		1.3	1.9		0.9	U
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	ng/l	0.38	J	1.7 U	1.8	U	0.61	J
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	ng/l	1.7 、	J	1.2 J	2.5		2.4	
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	ng/l	1 .	J	0.69 J	1.1	J	0.82	J
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	ng/l	1.6 、	J	1.7 J	2.8		4.8	
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	ng/l	6.4		2.9	5.4		11	
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	ng/l	0.89	U	0.86 U	0.88	U	0.9	U
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	ng/l	0.89	U	0.86 U	0.88	U	0.9	U
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	ng/l	1.8	U	1.7 U	1.8	U	1.8	U

#### Notes:

FS = field sample; FB = field blank
U = Not detected, value is the reporting limit
J = Value is estimated
ng/l = nanograms per liter

Created by: KMS 8/15/19

Checked by: EAP 8/15/19

			Location	2046391	2052690
		Lab Sample De	livery Group	MP-1 #14	MP-1 #01
		Field S	Sample Date	5/29/2019	5/29/2019
		Fiel	d Sample ID	OC-MP-1#14-XXX	OC-MP-1#1-XXX
			QC Code	FS	FS
Method	Fraction		Units	Result Qualifier	Result Qualifier
EPA 537.1 MOD	N	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ng/l	2.7 U	75 UJ
EPA 537.1 MOD	N	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ng/l	2.7 U	75 UJ
EPA 537.1 MOD	N	Perfluorobutanesulfonic acid (PFBS)	ng/l	0.82 J	25 UJ
EPA 537.1 MOD	N	Perfluorodecanoic acid (PFDA)	ng/l	1.8 U	50 UJ
EPA 537.1 MOD	N	Perfluorododecanoic acid (PFDoA)	ng/l	1.8 U	50 UJ
EPA 537.1 MOD	N	Perfluoroheptanoic acid (PFHpA)	ng/l	1.5	25 UJ
EPA 537.1 MOD	N	Perfluorohexanesulfonic acid (PFHxS)	ng/l	0.47 J	50 UJ
EPA 537.1 MOD	N	Perfluorohexanoic acid (PFHxA)	ng/l	2	50 UJ
EPA 537.1 MOD	N	Perfluorononanoic acid (PFNA)	ng/l	1.2 J	50 UJ
EPA 537.1 MOD	N	Perfluorooctanessulfonic acid (PFOS)	ng/l	2.8	50 UJ
EPA 537.1 MOD	N	Perfluorooctanoic acid (PFOA)	ng/l	5.1	25 UJ
EPA 537.1 MOD	N	Perfluorotetradecanoic acid (PFTeDA)	ng/l	0.9 U	25 UJ
EPA 537.1 MOD	N	Perfluorotridecanoic acid (PFTrDA)	ng/l	0.9 U	25 UJ
EPA 537.1 MOD	N	Perfluoroundecanoic acid (PFUnDA)	ng/l	1.8 U	50 UJ

Notes:

FS = field sample; FB = field blank

U = Not detected, value is the reporting limit

J = Value is estimated

ng/l = nanograms per liter

Lab Sample Delivery Group	Analysis Method	Lab Sample ID	Field Sample ID	Parameter	Lab Result	Lab Qualifier	Final Result	Final Qualifier	Val Reason Code	Units	Lab ID
2046067	EPA 537.1 MOD	1067736	OC-GW-54D-DUP	Perfluoroheptanoic acid (PFHpA)	1.1		1.1	J	MS-H	ng/l	Lancast
2046067	EPA 537.1 MOD	1067736		Perfluorohexanoic acid (PFHxA)	1.8	J	1.8		MS-H, Q	ng/l	Lancast
2046067	EPA 537.1 MOD	1067736		Perfluorononanoic acid (PFNA)	1		1	J	MS-H, Q	ng/l	Lancast
2046067	EPA 537.1 MOD	1067737		Perfluoroheptanoic acid (PFHpA)	1.1		1.1	J	MS-H	ng/l	Lancast
2046067	EPA 537.1 MOD	1067737	OC-GW-54D-XXX	Perfluorohexanoic acid (PFHxA)	1.7	J	1.7	J	MS-H, Q	ng/l	Lancast
2046067	EPA 537.1 MOD	1067737	OC-GW-54D-XXX	Perfluorononanoic acid (PFNA)	1.1	J	1.1	J	MS-H, Q	ng/l	Lancast
2046391	EPA 537.1 MOD	1069025	OC-MP-1#4-XXX	Perfluorobutanesulfonic acid (PFBS)	0.42	J	0.42	J	IS-L, Q	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	75	U	75	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	) 75 U 75 UJ I		HT	ng/l	Lancast		
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorobutanesulfonic acid (PFBS)	25	U	25		HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorodecanoic acid (PFDA)	50	U	50		HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorododecanoic acid (PFDoA)	50	U	50	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluoroheptanoic acid (PFHpA)	25	U	25		HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorohexanesulfonic acid (PFHxS)	50	U	50	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483		Perfluorohexanoic acid (PFHxA)	50	U	50	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorononanoic acid (PFNA)	50	U	50	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorooctanessulfonic acid (PFOS)	50	U	50	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorooctanoic acid (PFOA)	25	U	25	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorotetradecanoic acid (PFTeDA)	25	U	25	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluorotridecanoic acid (PFTrDA)	25	U	25	UJ	HT	ng/l	Lancast
2052690	EPA 537.1 MOD	1097483	OC-MP-1#1-XXX	Perfluoroundecanoic acid (PFUnDA)	50	U	50	UJ	HT	ng/l	Lancast

### Units:

ng/l = nanograms per liter

### Validation Qualifiers:

U = Not detected, value is the reporting limit

J = Value is estimated

### **Validation Reason Codes:**

HT = Holding time for prep or analysis exceeded

IS-L = Internal standard response below limit

MS-H = MS and/or MSD recovery high

Q = Constituent was detected between the MDL and RL

Prepared by / Date: KMS 8/15/19 Checked by / Date: EAP 8/15/19



## ATTACHMENT C LABORATORY ANALYTICAL REPORT









#### **ANALYSIS REPORT**

Prepared by:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 Prepared for:

TestAmerica 501 Southampton Road Suite C Westfield MA 01085

Report Date: June 07, 2019 15:28

**Project: Olin Wilmington** 

Account #: 01042 Group Number: 2046067 SDG: TAO18 PO Number: 48006612 Release Number: REWI0025 State of Sample Origin: MA

Electronic Copy To Olin Chemicals Attn: James Cashwell Electronic Copy To Olin Corporation Attn: Chinny Esakkiperumal Attn: Binks Colby-George Electronic Copy To Wood PLC Attn: Tige Cunningham Electronic Copy To Wood PLC Electronic Copy To Wood PLC Attn: Chris Ricardi Electronic Copy To Wood PLC Attn: Karen Savage Electronic Copy To Wood PLC Attn: Peter Thompson Electronic Copy To Wood PLC Attn: Chris Mazzolini Electronic Copy To Wood Attn: Elizabeth Penta

Respectfully Submitted,

Zyn M. Frederiksen

Principal Specialist Group Leader

(717) 556-7255

To view our laboratory's current scopes of accreditation please go to <a href="https://www.eurofinsus.com/environment-testing/laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/">https://www.eurofinsus.com/environmental-testing/laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/</a>. Historical copies may be requested through your project manager.



### Lancaster Laboratories Environmental







2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

### **SAMPLE INFORMATION**

Client Sample Description	Sample Collection Date/Time	ELLE#
OC-FB-052819 Water	05/28/2019 13:15	1067731
OC-GW-15-XXX Groundwater	05/28/2019 15:57	1067732
OC-GW-16R-XXX Groundwater	05/28/2019 13:47	1067733
OC-GW-32D-XXX Groundwater	05/28/2019 15:05	1067734
OC-GW-32S-XXX Groundwater	05/28/2019 15:55	1067735
OC-GW-54D-DUP Groundwater	05/28/2019 13:30	1067736
OC-GW-54D-XXX Groundwater	05/28/2019 13:30	1067737
OC-GW-54D-MS Groundwater	05/28/2019 13:30	1067738
OC-GW-54D-MSD Groundwater	05/28/2019 13:30	1067739
OC-BR-1-XXX Groundwater	05/28/2019 17:30	1067740
OC-GW-101-XXX Groundwater	05/28/2019 18:13	1067741

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



### Lancaster Laboratories Environmental







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### **MADEP MCP Analytical Method Report Certification Form**

Laboratory Name: Eurofins Lancaster Laboratories Environmental

Project: Olin Wilmington

This form provides certifications for the following data set: 1067731-1067741

Sample Matrices: Water

Methods Used:

EPA 537 Version 1.1 Modified

Affir	mative responses to questions A through F are required for "Presumptive Certainty" status	Yes or No <sup>1</sup>
Α	Were all samples received in a condition consistent with those described on the Chain-of-	
	Custody, properly preserved (including temperature) in the field or laboratory, and	Yes
	prepared/analyzed within method holding times?	
В	Were the analytical method(s) and all associated QC requirements specified in the selected	Yes
	CAM protocol(s) followed?	100
С	Were all required corrective actions and analytical response actions specified in the selected	Yes
	CAM protocol(s) implemented for all identified performance standard non-conformances?	103
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A,	
	"Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of	Yes
	Analytical Data"?	
Е	VPH, EPH, APH, and TO-15 only:	
	a. VPH, EPH, and APH Methods only: Was each method conducted without significant	NA
	modification(s)? (Refer to the individual method(s) for a list of significant modifications).	
	b. APH and TO-15 Methods only. Was the complete analyte list reported for each method?	NA
F	Were all applicable CAM protocol QC and performance standard non-conformances identified	Yes
	and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	1.00
	ponses to Questions G, H and I below are required for "Presumptive Certainty" status	1
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM	Yes
	protocol(s)?	
	<u>Data User Note</u> : Data that achieve "Presumptive Certainty" status may not necessarily meet the data usa	bility
	and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.	l NI-
<u>H</u>	Were all QC performance standards specified in the CAM protocol(s) achieved?	No
1 -	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	Yes
	fer to the Case Narrative for information regarding negative responses.	
	e undersigned, attest under the pains and penalties of perjury that the material contained in this an	alytical
repo	ort is, to the best of my knowledge and belief, accurate and complete.	

Christiane S. Sweigart Senior Specialist



### Case Narrative

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Project Name: Olin Wilmington ELLE Group #: 2046067

#### **General Comments:**

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

#### **Analysis Specific Comments:**

#### EPA 537 Version 1.1 Modified, LC/MS/MS Miscellaneous

Batch #: 19151009 (Sample number(s): 1067731-1067741 UNSPK: 1067737)

The recovery(ies) for the following analyte(s) in the MS and/or MSD exceeded the acceptance window indicating a positive bias: Perfluorononanoic acid, Perfluorododecanoic acid, Perfluorohexanoic acid, Perfluorotetradecanoic acid, Perfluorotetradecanoic acid

The recovery(ies) for one or more surrogates exceeded the acceptance window indicating a positive bias for sample(s) 1067739, MSD

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

Sample Description: OC-FB-052819 Water

**Olin Wilmington** 

Project Name: Olin Wilmington

 Submittal Date/Time:
 05/29/2019 10:20

 Collection Date/Time:
 05/28/2019 13:15

 SDG#:
 TAO18-01FB

TestAmerica

ELLE Sample #: GW 1067731 ELLE Group #: 2046067

Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	6/MS Miscellaneous EPA 53 Modifie	7 Version 1.1	ng/l	ng/l	
14473	NEtFOSAA¹ NEtFOSAA is the acronym for N-ethy	2991-50-6 /I perfluorooctanesulfona	N.D. midoacetic Acid.	2.6	1
14473	NMeFOSAA <sup>1</sup> NMeFOSAA is the acronym for N-me	2355-31-9 ethyl perfluorooctanesulfo	N.D. namidoacetic Acid.	2.6	1
14473	Perfluorobutanesulfonic acid1	375-73-5	N.D.	0.87	1
14473	Perfluorodecanoic acid1	335-76-2	N.D.	1.7	1
14473	Perfluorododecanoic acid1	307-55-1	N.D.	1.7	1
14473	Perfluoroheptanoic acid1	375-85-9	N.D.	0.87	1
14473	Perfluorohexanesulfonic acid1	355-46-4	N.D.	1.7	1
14473	Perfluorohexanoic acid1	307-24-4	N.D.	1.7	1
14473	Perfluorononanoic acid1	375-95-1	N.D.	1.7	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	N.D.	1.7	1
14473	Perfluorooctanoic acid1	335-67-1	N.D.	0.87	1
14473	Perfluorotetradecanoic acid1	376-06-7	N.D.	0.87	1
14473	Perfluorotridecanoic acid1	72629-94-8	N.D.	0.87	1
14473	Perfluoroundecanoic acid1	2058-94-8	N.D.	1.7	1

### **Sample Comments**

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

#### **Laboratory Sample Analysis Record** Method CAT **Analysis Name** Trial# Batch# **Analysis** Analyst Dilution Date and Time No. Factor EPA 537 Version 1.1 14473 14 PFAS 19151009 Jason W Knight 06/05/2019 00:23 Modified EPA 537 Version 1.1 PFAS Water Prep 1 19151009 05/31/2019 16:30 Isaac Phillips-Cary 1 14091 Modified

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

GW 1067732

2046067

TestAmerica ELLE Sample #:

**ELLE Group #:** 

Matrix: Groundwater

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Sample Description: OC-GW-15-XXX Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 15:57

SDG#: TAO18-02

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	S/MS Miscellaneous EPA 537 Modified	ng/l	ng/l		
14473	NEtFOSAA <sup>1</sup> NEtFOSAA is the acronym for N-ethyl	2991-50-6 perfluorooctanesulfona	N.D. midoacetic Acid.	2.7	1
14473	NMeFOSAA <sup>1</sup> NMeFOSAA is the acronym for N-met	2355-31-9 hyl perfluorooctanesulfo	N.D. namidoacetic Acid.	2.7	1
14473	Perfluorobutanesulfonic acid1	375-73-5	0.99	0.90	1
14473	Perfluorodecanoic acid1	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid <sup>1</sup>	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid <sup>1</sup>	375-85-9	0.52 J	0.90	1
14473	Perfluorohexanesulfonic acid1	355-46-4	0.44 J	1.8	1
14473	Perfluorohexanoic acid <sup>1</sup>	307-24-4	0.68 J	1.8	1
14473	Perfluorononanoic acid1	375-95-1	N.D.	1.8	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	3.5	1.8	1
14473	Perfluorooctanoic acid1	335-67-1	2.5	0.90	1
14473	Perfluorotetradecanoic acid1	376-06-7	N.D.	0.90	1
14473	Perfluorotridecanoic acid <sup>1</sup>	72629-94-8	N.D.	0.90	1
14473	Perfluoroundecanoic acid1	2058-94-8	N.D.	1.8	1

### **Sample Comments**

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

#### **Laboratory Sample Analysis Record** Method CAT **Analysis Name** Trial# Batch# **Analysis** Analyst Dilution Date and Time No. Factor EPA 537 Version 1.1 14473 14 PFAS 19151009 06/05/2019 00:33 Jason W Knight Modified EPA 537 Version 1.1 PFAS Water Prep 19151009 05/31/2019 16:30 Isaac Phillips-Cary 1 14091 Modified

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

GW 1067733

2046067

TestAmerica ELLE Sample #:

**ELLE Group #:** 

Matrix: Groundwater

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

Sample Description: OC-GW-16R-XXX Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

SDG#: TAO18-03

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	/MS Miscellaneous EPA 537 Modified	Version 1.1	ng/l	ng/l	
14473	NEtFOSAA <sup>1</sup> NEtFOSAA is the acronym for N-ethyl	2991-50-6 perfluorooctanesulfona	N.D. midoacetic Acid.	2.6	1
14473	NMeFOSAA¹ NMeFOSAA is the acronym for N-meth	2355-31-9 nyl perfluorooctanesulfo	N.D. onamidoacetic Acid.	2.6	1
14473	Perfluorobutanesulfonic acid1	375-73-5	0.83 J	0.86	1
14473	Perfluorodecanoic acid <sup>1</sup>	335-76-2	N.D.	1.7	1
14473	Perfluorododecanoic acid1	307-55-1	N.D.	1.7	1
14473	Perfluoroheptanoic acid1	375-85-9	0.89	0.86	1
14473	Perfluorohexanesulfonic acid1	355-46-4	N.D.	1.7	1
14473	Perfluorohexanoic acid1	307-24-4	1.6 J	1.7	1
14473	Perfluorononanoic acid1	375-95-1	0.55 J	1.7	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	2.0	1.7	1
14473	Perfluorooctanoic acid1	335-67-1	3.2	0.86	1
14473	Perfluorotetradecanoic acid1	376-06-7	N.D.	0.86	1
14473	Perfluorotridecanoic acid <sup>1</sup>	72629-94-8	N.D.	0.86	1
14473	Perfluoroundecanoic acid1	2058-94-8	N.D.	1.7	1

### **Sample Comments**

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

	Laboratory Sample Analysis Record										
CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor				
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 00:42	Jason W Knight	1				
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1				

1

GW 1067734

2046067

**TestAmerica ELLE Sample #:** 

**ELLE Group #:** 

Matrix: Groundwater

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

Sample Description: **OC-GW-32D-XXX Groundwater** 

**Olin Wilmington** 

**Olin Wilmington Project Name:** 

Submittal Date/Time: 05/29/2019 10:20 Collection Date/Time: 05/28/2019 15:05

Perfluorotridecanoic acid1

Perfluoroundecanoic acid1

14473

14473

SDG#:	TA	.018-04			
CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	/MS Miscellaneous	EPA 537 Version 1.1 Modified	ng/l	ng/l	
14473	NEtFOSAA¹ NEtFOSAA is the acronyi	2991-50-6 m for N-ethyl perfluorooctanesulfona	1.8 J amidoacetic Acid.	2.7	1
14473	NMeFOSAA <sup>1</sup> NMeFOSAA is the acrony	2355-31-9 ym for N-methyl perfluorooctanesulf	N.D. onamidoacetic Acid.	2.7	1
14473	Perfluorobutanesulfonic a	acid¹ 375-73-5	0.87 J	0.90	1
14473	Perfluorodecanoic acid1	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid	<sup>1</sup> 307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid1	375-85-9	1.4	0.90	1
14473	Perfluorohexanesulfonic	acid <sup>1</sup> 355-46-4	0.65 J	1.8	1
14473	Perfluorohexanoic acid1	307-24-4	1.8 J	1.8	1
14473	Perfluorononanoic acid1	375-95-1	0.97 J	1.8	1
14473	Perfluorooctanesulfonic a	acid¹ 1763-23-1	8.1	1.8	1
14473	Perfluorooctanoic acid1	335-67-1	5.0	0.90	1
14473	Perfluorotetradecanoic ad	cid <sup>1</sup> 376-06-7	N.D.	0.90	1

### **Sample Comments**

0.90

1.8

N.D.

N.D.

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

72629-94-8

2058-94-8

#### **Laboratory Sample Analysis Record** Method CAT **Analysis Name** Trial# Batch# **Analysis** Analyst Dilution No. **Date and Time** Factor 14 PFAS EPA 537 Version 1.1 19151009 06/05/2019 01:00 Jason W Knight 14473 Modified EPA 537 Version 1.1 PFAS Water Prep 19151009 05/31/2019 16:30 Isaac Phillips-Cary 1 14091 Modified

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

GW 1067735

2046067

**TestAmerica** 

ELLE Sample #:

Matrix: Groundwater

**ELLE Group #:** 

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

Sample Description: OC-GW-32S-XXX Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

Submittal Date/Time: 05/29/2019 10:20 Collection Date/Time: 05/28/2019 15:55

SDG#: TAO18-05

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	MS Miscellaneous EPA 53 Modifie	7 Version 1.1	ng/l	ng/l	
14473	NEtFOSAA <sup>1</sup> NEtFOSAA is the acronym for N-ethy	2991-50-6 I perfluorooctanesulfona	N.D. midoacetic Acid.	2.7	1
14473	NMeFOSAA <sup>1</sup> NMeFOSAA is the acronym for N-me	2355-31-9 thyl perfluorooctanesulfo	N.D. onamidoacetic Acid.	2.7	1
14473	Perfluorobutanesulfonic acid1	375-73-5	N.D.	0.91	1
14473	Perfluorodecanoic acid1	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid1	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid1	375-85-9	0.45 J	0.91	1
14473	Perfluorohexanesulfonic acid1	355-46-4	N.D.	1.8	1
14473	Perfluorohexanoic acid1	307-24-4	N.D.	1.8	1
14473	Perfluorononanoic acid1	375-95-1	N.D.	1.8	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	0.51 J	1.8	1
14473	Perfluorooctanoic acid1	335-67-1	1.7	0.91	1
14473	Perfluorotetradecanoic acid1	376-06-7	N.D.	0.91	1
14473	Perfluorotridecanoic acid1	72629-94-8	N.D.	0.91	1
14473	Perfluoroundecanoic acid1	2058-94-8	N.D.	1.8	1

### **Sample Comments**

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

	Laboratory Sample Analysis Record						
CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 01:09	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

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Sample Description: OC-GW-54D-DUP Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 13:30
SDG#: TAO18-06FD

**TestAmerica** 

ELLE Sample #: GW 1067736 ELLE Group #: 2046067

Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	MS Miscellaneous EPA 537	Version 1.1	ng/l	ng/l	
14473	NEtFOSAA¹ NEtFOSAA is the acronym for N-ethyl	2991-50-6 perfluorooctanesulfonal	N.D. midoacetic Acid.	2.7	1
14473	NMeFOSAA <sup>1</sup> NMeFOSAA is the acronym for N-met	2355-31-9 hyl perfluorooctanesulfo	N.D. namidoacetic Acid.	2.7	1
14473	Perfluorobutanesulfonic acid1	375-73-5	0.49 J	0.89	1
14473	Perfluorodecanoic acid1	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid1	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid1	375-85-9	1.1	0.89	1
14473	Perfluorohexanesulfonic acid1	355-46-4	N.D.	1.8	1
14473	Perfluorohexanoic acid1	307-24-4	1.8 J	1.8	1
14473	Perfluorononanoic acid1	375-95-1	1.0 J	1.8	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	1.5 J	1.8	1
14473	Perfluorooctanoic acid1	335-67-1	2.2	0.89	1
14473	Perfluorotetradecanoic acid1	376-06-7	N.D.	0.89	1
14473	Perfluorotridecanoic acid1	72629-94-8	N.D.	0.89	1
14473	Perfluoroundecanoic acid1	2058-94-8	N.D.	1.8	1

### **Sample Comments**

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

	Laboratory Sample Analysis Record						
CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 01:18	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

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Sample Description: OC-GW-54D-XXX Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 13:30
SDG#: TAO18-07BKG

**TestAmerica** 

ELLE Sample #: GW 1067737 ELLE Group #: 2046067

Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	/MS Miscellaneous EPA 537 Modified	Version 1.1	ng/l	ng/l	
14473	NEtFOSAA <sup>1</sup> NEtFOSAA is the acronym for N-ethyl	2991-50-6 perfluorooctanesulfonal	N.D. midoacetic Acid.	2.7	1
14473	NMeFOSAA¹ NMeFOSAA is the acronym for N-met	2355-31-9 hyl perfluorooctanesulfo	N.D. namidoacetic Acid.	2.7	1
14473	Perfluorobutanesulfonic acid1	375-73-5	0.54 J	0.89	1
14473	Perfluorodecanoic acid1	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid1	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid <sup>1</sup>	375-85-9	1.1	0.89	1
14473	Perfluorohexanesulfonic acid¹	355-46-4	N.D.	1.8	1
14473	Perfluorohexanoic acid1	307-24-4	1.7 J	1.8	1
14473	Perfluorononanoic acid1	375-95-1	1.1 J	1.8	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	1.6 J	1.8	1
14473	Perfluorooctanoic acid1	335-67-1	2.4	0.89	1
14473	Perfluorotetradecanoic acid1	376-06-7	N.D.	0.89	1
14473	Perfluorotridecanoic acid1	72629-94-8	N.D.	0.89	1
14473	Perfluoroundecanoic acid1	2058-94-8	N.D.	1.8	1

### **Sample Comments**

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

	Laboratory Sample Analysis Record						
CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 01:27	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

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Sample Description: OC-GW-54D-MS Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 13:30
SDG#: TAO18-07MS

**TestAmerica** 

ELLE Sample #: GW 1067738 ELLE Group #: 2046067

Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	/MS Miscellaneous EPA 537 Modified	7 Version 1.1 d	ng/l	ng/l	
14473	NEtFOSAA <sup>1</sup> NEtFOSAA is the acronym for N-ethyl	2991-50-6 perfluorooctanesulfona	6.1 midoacetic Acid.	2.7	1
14473	NMeFOSAA¹ NMeFOSAA is the acronym for N-met	2355-31-9 hyl perfluorooctanesulfo	5.5 onamidoacetic Acid.	2.7	1
14473	Perfluorobutanesulfonic acid1	375-73-5	6.2	0.89	1
14473	Perfluorodecanoic acid1	335-76-2	5.9	1.8	1
14473	Perfluorododecanoic acid1	307-55-1	6.7	1.8	1
14473	Perfluoroheptanoic acid1	375-85-9	8.0	0.89	1
14473	Perfluorohexanesulfonic acid1	355-46-4	5.9	1.8	1
14473	Perfluorohexanoic acid1	307-24-4	8.7	1.8	1
14473	Perfluorononanoic acid1	375-95-1	7.9	1.8	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	6.6	1.8	1
14473	Perfluorooctanoic acid1	335-67-1	9.1	0.89	1
14473	Perfluorotetradecanoic acid1	376-06-7	7.0	0.89	1
14473	Perfluorotridecanoic acid <sup>1</sup>	72629-94-8	6.5	0.89	1
14473	Perfluoroundecanoic acid <sup>1</sup>	2058-94-8	6.6	1.8	1

### **Sample Comments**

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

#### **Laboratory Sample Analysis Record** Method CAT **Analysis Name** Trial# Batch# **Analysis** Analyst Dilution Date and Time No. Factor EPA 537 Version 1.1 14473 14 PFAS 19151009 06/05/2019 01:36 Jason W Knight Modified EPA 537 Version 1.1 PFAS Water Prep 19151009 05/31/2019 16:30 Isaac Phillips-Cary 1 14091 Modified

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

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Sample Description: OC-GW-54D-MSD Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

Submittal Date/Time: 05/29/2019 10:20
Collection Date/Time: 05/28/2019 13:30
SDG#: TAO18-07MSD

**TestAmerica** 

ELLE Sample #: GW 1067739 ELLE Group #: 2046067

Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	/MS Miscellaneous EPA 537 V Modified	ersion 1.1	ng/l	ng/l	
14473	NEtFOSAA <sup>1</sup> NEtFOSAA is the acronym for N-ethyl pe	2991-50-6 rfluorooctanesulfona	6.1 midoacetic Acid.	2.7	1
14473	NMeFOSAA <sup>1</sup> NMeFOSAA is the acronym for N-methyl	2355-31-9 perfluorooctanesulfo	6.6 namidoacetic Acid.	2.7	1
14473	Perfluorobutanesulfonic acid1	375-73-5	6.1	0.90	1
14473	Perfluorodecanoic acid <sup>1</sup>	335-76-2	6.8	1.8	1
14473	Perfluorododecanoic acid <sup>1</sup>	307-55-1	6.9	1.8	1
14473	Perfluoroheptanoic acid <sup>1</sup>	375-85-9	8.2	0.90	1
14473	Perfluorohexanesulfonic acid <sup>1</sup>	355-46-4	6.4	1.8	1
14473	Perfluorohexanoic acid <sup>1</sup>	307-24-4	8.3	1.8	1
14473	Perfluorononanoic acid1	375-95-1	8.1	1.8	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	6.6	1.8	1
14473	Perfluorooctanoic acid1	335-67-1	9.3	0.90	1
14473	Perfluorotetradecanoic acid1	376-06-7	6.5	0.90	1
14473	Perfluorotridecanoic acid1	72629-94-8	6.8	0.90	1
14473	Perfluoroundecanoic acid <sup>1</sup>	2058-94-8	6.3	1.8	1

### **Sample Comments**

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

	Laboratory Sample Analysis Record						
CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 01:45	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

GW 1067740

2046067

TestAmerica ELLE Sample #:

**ELLE Group #:** 

Matrix: Groundwater

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Sample Description: OC-BR-1-XXX Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

Submittal Date/Time: 05/29/2019 10:20 Collection Date/Time: 05/28/2019 17:30

SDG#: TAO18-08

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	/MS Miscellaneous EPA 537 Modified	7 Version 1.1 d	ng/l	ng/l	
14473	NEtFOSAA <sup>1</sup> NEtFOSAA is the acronym for N-ethyl	2991-50-6 perfluorooctanesulfonal	N.D. midoacetic Acid.	2.7	1
14473	NMeFOSAA¹ NMeFOSAA is the acronym for N-met	2355-31-9 hyl perfluorooctanesulfo	N.D. namidoacetic Acid.	2.7	1
14473	Perfluorobutanesulfonic acid1	375-73-5	0.78 J	0.91	1
14473	Perfluorodecanoic acid <sup>1</sup>	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid1	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid1	375-85-9	2.1	0.91	1
14473	Perfluorohexanesulfonic acid1	355-46-4	1.1 J	1.8	1
14473	Perfluorohexanoic acid <sup>1</sup>	307-24-4	3.4	1.8	1
14473	Perfluorononanoic acid1	375-95-1	1.1 J	1.8	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	6.4	1.8	1
14473	Perfluorooctanoic acid1	335-67-1	8.4	0.91	1
14473	Perfluorotetradecanoic acid1	376-06-7	N.D.	0.91	1
14473	Perfluorotridecanoic acid <sup>1</sup>	72629-94-8	N.D.	0.91	1
14473	Perfluoroundecanoic acid1	2058-94-8	N.D.	1.8	1

### **Sample Comments**

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

#### **Laboratory Sample Analysis Record** Method CAT **Analysis Name** Trial# Batch# **Analysis** Analyst Dilution Date and Time No. Factor EPA 537 Version 1.1 14473 14 PFAS 19151009 06/05/2019 01:54 Jason W Knight Modified EPA 537 Version 1.1 PFAS Water Prep 1 19151009 05/31/2019 16:30 Isaac Phillips-Cary 1 14091 Modified

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

Sample Description: OC-GW-101-XXX Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

Submittal Date/Time: 05/29/2019 10:20 Collection Date/Time: 05/28/2019 18:13

SDG#: TAO18-09

restAmerica	
ELLE Sample #:	GW 1067741
ELLE Group #:	2046067

ELLE Group #: 20
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	/MS Miscellaneous EPA 537 Ve Modified	ersion 1.1	ng/l	ng/l	
14473	NEtFOSAA¹ NEtFOSAA is the acronym for N-ethyl perf	2991-50-6 Iuorooctanesulfonan	N.D. nidoacetic Acid.	2.5	1
14473	NMeFOSAA <sup>1</sup> NMeFOSAA is the acronym for N-methyl p	2355-31-9 perfluorooctanesulfor	N.D. namidoacetic Acid.	2.5	1
14473	Perfluorobutanesulfonic acid1	375-73-5	0.76 J	0.84	1
14473	Perfluorodecanoic acid1	335-76-2	N.D.	1.7	1
14473	Perfluorododecanoic acid1	307-55-1	N.D.	1.7	1
14473	Perfluoroheptanoic acid1	375-85-9	2.3	0.84	1
14473	Perfluorohexanesulfonic acid1	355-46-4	N.D.	1.7	1
14473	Perfluorohexanoic acid1	307-24-4	5.3	1.7	1
14473	Perfluorononanoic acid1	375-95-1	1.3 J	1.7	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	5.1	1.7	1
14473	Perfluorooctanoic acid1	335-67-1	5.2	0.84	1
14473	Perfluorotetradecanoic acid1	376-06-7	N.D.	0.84	1
14473	Perfluorotridecanoic acid1	72629-94-8	N.D.	0.84	1
14473	Perfluoroundecanoic acid <sup>1</sup>	2058-94-8	N.D.	1.7	1

### **Sample Comments**

 $<sup>^{1}</sup>$  = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

	Laboratory Sample Analysis Record						
CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19151009	06/05/2019 02:03	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19151009	05/31/2019 16:30	Isaac Phillips-Cary	1

### **Quality Control Summary**

Client Name: TestAmerica Group Number: 2046067

Reported: 06/07/2019 15:28

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

### **Method Blank**

Analysis Name	Result	LOQ	
	ng/l	ng/l	
Batch number: 19151009	Sample numb	oer(s): 1067731-106774	1
NEtFOSAA	N.D.	3.0	
NMeFOSAA	N.D.	3.0	
Perfluorobutanesulfonic acid	N.D.	1.0	
Perfluorodecanoic acid	N.D.	2.0	
Perfluorododecanoic acid	N.D.	2.0	
Perfluoroheptanoic acid	N.D.	1.0	
Perfluorohexanesulfonic acid	N.D.	2.0	
Perfluorohexanoic acid	N.D.	2.0	
Perfluorononanoic acid	N.D.	2.0	
Perfluorooctanesulfonic acid	N.D.	2.0	
Perfluorooctanoic acid	N.D.	1.0	
Perfluorotetradecanoic acid	N.D.	1.0	
Perfluorotridecanoic acid	N.D.	1.0	
Perfluoroundecanoic acid	N.D.	2.0	

#### LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 19151009	Sample number(	s): 1067731-1	1067741						
NEtFOSAA	5.44	5.32			98		55-169		
NMeFOSAA	5.44	5.21			96		44-147		
Perfluorobutanesulfonic acid	4.81	4.75			99		73-128		
Perfluorodecanoic acid	5.44	5.09			94		69-148		
Perfluorododecanoic acid	5.44	5.50			101		75-136		
Perfluoroheptanoic acid	5.44	5.89			108		76-140		
Perfluorohexanesulfonic acid	5.14	4.95			96		71-131		
Perfluorohexanoic acid	5.44	6.07			112		75-135		
Perfluorononanoic acid	5.44	5.54			102		72-148		
Perfluorooctanesulfonic acid	5.20	4.76			92		67-138		
Perfluorooctanoic acid	5.44	5.53			102		72-138		
Perfluorotetradecanoic acid	5.44	4.79			88		74-135		
Perfluorotridecanoic acid	5.44	5.70			105		61-145		
Perfluoroundecanoic acid	5.44	5.38			99		75-146		

<sup>\*-</sup> Outside of specification

<sup>(1)</sup> The result for one or both determinations was less than five times the LOQ.

<sup>(2)</sup> The unspiked result was more than four times the spike added.

### **Quality Control Summary**

Client Name: TestAmerica Group Number: 2046067

Reported: 06/07/2019 15:28

#### MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ng/l	MS Spike Added ng/l	MS Conc ng/l	MSD Spike Added ng/l	MSD Conc ng/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 19151009	Sample number	er(s): 1067731-	1067741 U	INSPK: 1067737						
NEtFOSAA	N.D.	4.85	6.13	4.89	6.15	127	126	49-159	0	30
NMeFOSAA	N.D.	4.85	5.46	4.89	6.57	113	134	58-157	19	30
Perfluorobutanesulfonic acid	0.536	4.29	6.23	4.33	6.09	133	128	73-134	2	30
Perfluorodecanoic acid	N.D.	4.85	5.88	4.89	6.76	121	138	73-142	14	30
Perfluorododecanoic acid	N.D.	4.85	6.74	4.89	6.87	139*	140*	76-136	2	30
Perfluoroheptanoic acid	1.11	4.85	7.96	4.89	8.17	141*	144*	67-137	3	30
Perfluorohexanesulfonic acid	N.D.	4.58	5.93	4.63	6.43	129	139*	73-129	8	30
Perfluorohexanoic acid	1.74	4.85	8.74	4.89	8.34	144*	135*	70-130	5	30
Perfluorononanoic acid	1.08	4.85	7.95	4.89	8.11	142*	144*	70-130	2	30
Perfluorooctanesulfonic acid	1.56	4.63	6.63	4.68	6.63	109	108	48-154	0	30
Perfluorooctanoic acid	2.43	4.85	9.06	4.89	9.33	137	141	48-160	3	30
Perfluorotetradecanoic acid	N.D.	4.85	7.04	4.89	6.50	145*	133	78-133	8	30
Perfluorotridecanoic acid	N.D.	4.85	6.52	4.89	6.77	135	138	57-151	4	30
Perfluoroundecanoic acid	N.D.	4.85	6.55	4.89	6.32	135	129	66-137	4	30

### **Labeled Isotope Quality Control**

Labeled isotope recoveries which are outside of the QC window are confirmed unless otherwise noted on the analysis report.

Analysis Name: 14 PFAS Batch number: 19151009

	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA	13C8-PFOA	13C8-PFOS	
1067731	89	87	87	87	91	90	
1067732	111	72	84	75	79	81	
1067733	107	88	102	93	84	80	
1067734	108	89	100	91	94	88	
1067735	105	89	93	89	88	90	
1067736	102	84	101	84	85	86	
1067737	110	94	106	88	87	91	
1067738	100	93	102	84	88	85	
1067739	108	94	105	87	90	94	
1067740	103	84	87	75	88	95	
1067741	98	82	91	80	80	79	
Blank	82	81	82	86	85	82	
LCS	82	88	85	87	87	88	
MS	100	93	102	84	88	85	

<sup>\*-</sup> Outside of specification

<sup>(1)</sup> The result for one or both determinations was less than five times the LOQ.

<sup>(2)</sup> The unspiked result was more than four times the spike added.

### **Quality Control Summary**

Client Name: TestAmerica Group Number: 2046067 Reported: 06/07/2019 15:28

### **Labeled Isotope Quality Control**

Labeled isotope recoveries which are outside of the QC window are confirmed unless otherwise noted on the analysis report.

Analysis Name: 14 PFAS Batch number: 19151009

	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA	13C8-PFOA	13C8-PFOS
MSD	108	94	105	87	90	94
Limits:	26-148	35-138	34-126	35-126	48-122	50-121
	13C9-PFNA	13C6-PFDA	d3-NMeFOSAA	13C7-PFUnDA	d5-NEtFOSAA	13C2-PFDoDA
1067731	90	94	106	95	102	91
1067732	79	84	97	94	94	87
1067733	74	87	101	103	97	104
1067734	87	81	93	93	103	96
1067735	88	90	95	87	84	83
1067736	78	85	117	111	112	106
1067737	84	91	124	117	121	111
1067738	83	96	108	110	108	106
1067739	81	89	111	125	127	108
1067740	90	91	94	91	104	88
1067741	68	77	95	104	98	104
Blank	82	85	90	89	89	80
LCS	92	89	88	85	88	78
MS	83	96	108	110	108	106
MSD	81	89	111	125	127	108
Limits:	41-144	47-125	30-127	30-128	30-142	39-130

	13C2-PFTeDA
1067731	93
1067732	78
1067733	114
1067734	93
1067735	88
1067736	102
1067737	112
1067738	106
1067739	120*
1067740	97
1067741	107
Blank	86
LCS	90
MS	106
MSD	120*
Limits:	26-119

<sup>\*-</sup> Outside of specification

<sup>(1)</sup> The result for one or both determinations was less than five times the LOQ.

<sup>(2)</sup> The unspiked result was more than four times the spike added.



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### **Quality Control Summary**

Client Name: TestAmerica Group Number: 2046067

Reported: 06/07/2019 15:28

<sup>\*-</sup> Outside of specification

<sup>(1)</sup> The result for one or both determinations was less than five times the LOQ.

<sup>(2)</sup> The unspiked result was more than four times the spike added.

## A 01042 6 2046067 | S1067731-741



Wood Environment and Infrastructure, Inc. 511 Congress Street Portland, ME 04101 (207) 775-5401 SHIP TO: Lancaster Lab 2425 New Holland Pike Lancaster, PA 17601 Atten: Lynn Frederiksen Lab Phone# (717) 656-2300

### **CHAIN OF CUSTODY**

DATE: 5/28/2019

COC #: Olin190528A

PAGE: 1 OF 1

Project Name: Project Number:	Olin Wilmington	Project Contact: Phone Number:				Chris Mazzolini Chris = (339) 927-379	e .	Bill To: TestAmerica		Disposal Instru Shipment Meth		
Project Manager:	Libby Bowen	Project Phase:		.001.07	.01 ) 323-0104	Offits = (335) 827-375	0	Release Order must be noted a	in all involces	Waybill Number		
			And a China China San Barbara San Francisco Carlo Carl								,,,,,	
Sample Information								Methods for Analysis			RUSH	]
No. Sample ID  1 OC-FB-052819 2 OC-GW-15-XXX 3 OC-GW-16R-XXX 4 OC-GW-32D-XXX 5 OC-GW-32S-XXX 6 OC-GW-54D-DUP 7 OC-GW-54D-MS 8 OC-GW-54D-MSD	Date & Time Sampled 05/28/19 13:15 05/28/19 15:57 05/28/19 13:47 05/28/19 15:05 05/28/19 13:30 05/28/19 13:30 05/28/19 13:30	Matrix FB GW GW GW GW GW GW	Sample Type FB N N N FD MS MSD	CSWSW Z Z Z Z Y Y	X X X X X PFAS (537) Lancaster (2) 250mL HDPE						X X X X X X X X X X X X X X X X X X X	2 TOTAL BOTTLES
9 <i>OC-GW-</i> 54D-XXX	05/28/19 13:30	GW	N	N	X						x	2
10 OC-BR-1-XXX	05/28/19 17:30	GW	N	N	X						x	2
11 OC-GW-101-XXX	05/28/19 18:13	GW	N	N	X						x	2
12												
Sampler's Signature:  Light hours  Relinquished By/Affiliation:  Received By:  FedEx  Received By:  Received By:  Received By:  Relinquished By/Affiliation:	Elizabeth Penta wood -	Date: 5/28/2019 Date: 5/28/2019 Date: 5/28/2019 Date: 5/28/2019 Date:	Time: 18:30 Time: 18:45 Time: Time:		Broken Cor COC seat in Other probl WSDOT co Date contact	match samples: ntainer: ntact: ems: ntacted:	or Lab Use	Y or N Y or N Y or N		D# REWI0025 f = 48006612	alysis Reques	t
Received By (LAB):	f	Date:	Time:	<u>20</u>				Deliverables	: Level 2, Level 4	and EQUIS EZ I	EDD	



## Sample Administration Receipt Documentation Log

Doc Log ID: 250135

Group Number(s): 2046067

Client: Wood Env.

**Delivery and Receipt Information** 

Delivery Method: Fed Ex Arrival Timestamp: 05/29/2019 10:20

Number of Packages: 1 Number of Projects: 1

**Arrival Condition Summary** 

Shipping Container Sealed: Yes Sample IDs on COC match Containers: Yes

Custody Seal Present: Yes Sample Date/Times match COC: Yes

Custody Seal Intact: Yes VOA Vial Headspace ≥ 6mm: N/A

Samples Chilled: Yes Total Trip Blank Qty: 0

Paperwork Enclosed: Yes Air Quality Samples Present: No

Samples Intact: Yes

Missing Samples: No

Extra Samples: No

Discrepancy in Container Qty on COC: No

Unpacked by Nicole Reiff (25684) at 13:39 on 05/29/2019

**Samples Chilled Details** 

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

 Cooler#
 Thermometer ID
 Corrected Temp
 Therm. Type
 Ice Type
 Ice Present?
 Ice Container
 Elevated Temp?

 1
 DT146
 4.9
 DT
 Wet
 Y
 Bagged
 N



**BMQL** 

ppb

basis

Dry weight

parts per billion

as-received basis.

### **Explanation of Symbols and Abbreviations**

milliliter(s)

The following defines common symbols and abbreviations used in reporting technical data:

Below Minimum Quantitation Level

			` '
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IU	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm	aqueous liquids, ppm is usually take	n to be equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weight juivalent to one microliter per liter of gas.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Results printed under this heading have been adjusted for moisture content. This increases the analyte weight

concentration to approximate the value present in a similar sample without moisture. All other results are reported on an

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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### **Data Qualifiers**

Qualifier	Definition
С	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
Р	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised
	due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.









#### **ANALYSIS REPORT**

Prepared by:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 Prepared for:

TestAmerica 501 Southampton Road Suite C Westfield MA 01085

Report Date: June 12, 2019 11:59

**Project: Olin Wilmington** 

Account #: 01042 Group Number: 2046391 SDG: TAO18 PO Number: 48006612 State of Sample Origin: MA

Electronic Copy To	Olin Chemicals	Attn: James Cashwell
Electronic Copy To	Olin Corporation	Attn: Chinny Esakkiperumal
Electronic Copy To	Wood PLC	Attn: Binks Colby-George
Electronic Copy To	Wood PLC	Attn: Tige Cunningham
Electronic Copy To	Wood PLC	Attn: Chris Ricardi
Electronic Copy To	Wood PLC	Attn: Karen Savage
Electronic Copy To	Wood PLC	Attn: Peter Thompson
Electronic Copy To	Wood PLC	Attn: Chris Mazzolini
Electronic Copy To	Wood	Attn: Elizabeth Penta
Electronic Copy To	Wood PLC	Attn: Libby Bowen

Respectfully Submitted,

Lynn M. Frederiksen

Principal Specialist Group Leader

Lyn M. Frederiksen

(717) 556-7255

To view our laboratory's current scopes of accreditation please go to <a href="https://www.eurofinsus.com/environment-testing/laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/">https://www.eurofinsus.com/environmental-testing/laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/</a>. Historical copies may be requested through your project manager.



### Lancaster Laboratories Environmental







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### **SAMPLE INFORMATION**

Client Sample Description	Sample Collection	ELLE#
	<u>Date/Time</u>	
OC-GW-10DR-XXX Groundwater	05/29/2019 14:20	1069020
OC-GW-305-XXX Groundwater	05/29/2019 10:14	1069021
OC-GW-307-XXX Groundwater	05/29/2019 13:18	1069022
OC-MP-1#14-XXX Groundwater	05/29/2019 09:05	1069023
OC-MP-1#1-XXX Groundwater	05/29/2019 11:30	1069024
OC-MP-1#4-XXX Groundwater	05/29/2019 10:20	1069025

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



### Lancaster Laboratories Environmental







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### MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Eurofins Lancaster Laboratories Environmental

report is, to the best of my knowledge and belief, accurate and complete.

Project: Olin Wilmington

This form provides certifications for the following data set: 1069020-1069025

Sample Matrices: Water

Methods Used:

EPA 537 Version 1.1 Modified

Affirmative responses to questions A through F are required for "Presumptive Certainty" status						
Α	Were all samples received in a condition consistent with those described on the Chain-of-					
	Custody, properly preserved (including temperature) in the field or laboratory, and					
	prepared/analyzed within method holding times?					
В	Were the analytical method(s) and all associated QC requirements specified in the selected	Yes				
	CAM protocol(s) followed?	100				
С	Were all required corrective actions and analytical response actions specified in the selected	Yes				
	CAM protocol(s) implemented for all identified performance standard non-conformances?	162				
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A,					
	"Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of	Yes				
	Analytical Data"?					
E	VPH, EPH, APH, and TO-15 only:					
	a. VPH, EPH, and APH Methods only: Was each method conducted without significant	NA				
	modification(s)? (Refer to the individual method(s) for a list of significant modifications).					
	b. APH and TO-15 Methods only. Was the complete analyte list reported for each method?	NA				
F	Were all applicable CAM protocol QC and performance standard non-conformances identified	Yes				
	and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	163				
	Responses to Questions G, H and I below are required for "Presumptive Certainty" status					
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM	No				
	protocol(s)?					
<u>Data User Note</u> : Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability						
and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.						
Н	Were all QC performance standards specified in the CAM protocol(s) achieved?	Yes				
	Were results reported for the complete analyte list specified in the selected CAM protocol(s)? Yes					
<sup>1</sup> Refer to the Case Narrative for information regarding negative responses.						
I, the undersigned, attest under the pains and penalties of perjury that the material contained in this analytical						

Kenneth Boley

Senior Specialist, Quality Assurance



### Case Narrative

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Project Name: Olin Wilmington ELLE Group #: 2046391

#### **General Comments:**

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

#### **Analysis Specific Comments:**

#### EPA 537 Version 1.1 Modified, LC/MS/MS Miscellaneous

Sample #s: 1069024

Reporting limits were raised due to interference from the sample matrix.

Sample #s: 1069025

The sample injection internal standard peak areas were outside of the QC limits for both the initial injection and the re-injection. The values here are from the initial injection of the sample.

GW 1069020

2046391

**TestAmerica** ELLE Sample #:

**ELLE Group #:** 

Matrix: Groundwater

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Sample Description: **OC-GW-10DR-XXX Groundwater** 

**Olin Wilmington** 

**Project Name: Olin Wilmington** 

Submittal Date/Time: 05/30/2019 10:20 Collection Date/Time: SDG#: TAO18-10

05/29/2019 14:20

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS/	/MS Miscellaneous EPA 537 Ve Modified	rsion 1.1	ng/l	ng/l	
14473	NEtFOSAA¹ NEtFOSAA is the acronym for N-ethyl perf	2991-50-6 luorooctanesulfonan	N.D. nidoacetic Acid.	2.7	1
14473	NMeFOSAA <sup>1</sup> NMeFOSAA is the acronym for N-methyl p	2355-31-9 erfluorooctanesulfor	N.D. namidoacetic Acid.	2.7	1
14473	Perfluorobutanesulfonic acid1	375-73-5	0.70 J	0.89	1
14473	Perfluorodecanoic acid1	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid1	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid <sup>1</sup>	375-85-9	1.8	0.89	1
14473	Perfluorohexanesulfonic acid1	355-46-4	0.38 J	1.8	1
14473	Perfluorohexanoic acid1	307-24-4	1.7 J	1.8	1
14473	Perfluorononanoic acid1	375-95-1	1.0 J	1.8	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	1.6 J	1.8	1
14473	Perfluorooctanoic acid1	335-67-1	6.4	0.89	1
14473	Perfluorotetradecanoic acid1	376-06-7	N.D.	0.89	1
14473	Perfluorotridecanoic acid1	72629-94-8	N.D.	0.89	1
14473	Perfluoroundecanoic acid <sup>1</sup>	2058-94-8	N.D.	1.8	1

### **Sample Comments**

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

	Laboratory Sample Analysis Record						
CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19156008	06/06/2019 15:01	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19156008	06/05/2019 15:15	Isaac Phillips-Cary	1

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Sample Description: OC-GW-305-XXX Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

Submittal Date/Time: 05/30/2019 10:20 Collection Date/Time: 05/29/2019 10:14

SDG#: TAO18-11

**TestAmerica** 

ELLE Sample #: GW 1069021 ELLE Group #: 2046391

Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	/MS Miscellaneous EPA 537 Ve Modified	ersion 1.1	ng/l	ng/l	
14473	NEtFOSAA¹ NEtFOSAA is the acronym for N-ethyl perf	2991-50-6 luorooctanesulfonan	N.D. nidoacetic Acid.	2.6	1
14473	NMeFOSAA¹ NMeFOSAA is the acronym for N-methyl p	2355-31-9 erfluorooctanesulfor	N.D. namidoacetic Acid.	2.6	1
14473	Perfluorobutanesulfonic acid1	375-73-5	0.55 J	0.86	1
14473	Perfluorodecanoic acid1	335-76-2	N.D.	1.7	1
14473	Perfluorododecanoic acid <sup>1</sup>	307-55-1	N.D.	1.7	1
14473	Perfluoroheptanoic acid <sup>1</sup>	375-85-9	1.3	0.86	1
14473	Perfluorohexanesulfonic acid1	355-46-4	N.D.	1.7	1
14473	Perfluorohexanoic acid1	307-24-4	1.2 J	1.7	1
14473	Perfluorononanoic acid1	375-95-1	0.69 J	1.7	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	1.7 J	1.7	1
14473	Perfluorooctanoic acid1	335-67-1	2.9	0.86	1
14473	Perfluorotetradecanoic acid1	376-06-7	N.D.	0.86	1
14473	Perfluorotridecanoic acid1	72629-94-8	N.D.	0.86	1
14473	Perfluoroundecanoic acid <sup>1</sup>	2058-94-8	N.D.	1.7	1

### **Sample Comments**

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

	Laboratory Sample Analysis Record						
CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19156008	06/06/2019 15:10	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19156008	06/05/2019 15:15	Isaac Phillips-Cary	1

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-6766 • www.EurofinsUS.com/LancLabsEnv

Sample Description: OC-GW-307-XXX Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

Submittal Date/Time: 05/30/2019 10:20 Collection Date/Time: 05/29/2019 13:18

SDG#: TAO18-12

TestAmerica	
ELLE Sample #:	GW 1069022
ELLE Group #:	2046391

Matrix: Groundwater

14473 NMeFO NMeFO 14473 Perfluor 14473 Perfluor 14473 Perfluor 14473 Perfluor 14473 Perfluor 14473 Perfluor	Modified SAA <sup>1</sup> SAA is the acronym for N-ethyl perfl SAA <sup>1</sup> SAA is the acronym for N-methyl p	2991-50-6 luorooctanesulfonal 2355-31-9	N.D.	ng/l 2.7 2.7	1
NEtFOS 14473 NMeFO NMeFO 14473 Perfluor 14473 Perfluor 14473 Perfluor 14473 Perfluor 14473 Perfluor 14473 Perfluor	SAA is the acronym for N-ethyl perf DSAA¹ DSAA is the acronym for N-methyl p	luorooctanesulfona 2355-31-9	midoacetic Acid. N.D.		1
NMeFO 14473 Perfluor 14473 Perfluor 14473 Perfluor 14473 Perfluor 14473 Perfluor 14473 Perfluor	SAA is the acronym for N-methyl p			2.7	1
14473 Perfluor 14473 Perfluor 14473 Perfluor 14473 Perfluor 14473 Perfluor					
14473 Perfluor 14473 Perfluor 14473 Perfluor 14473 Perfluor	robutanesulfonic acid¹	375-73-5	1.2	0.88	1
14473 Perfluor 14473 Perfluor 14473 Perfluor	rodecanoic acid1	335-76-2	N.D.	1.8	1
14473 Perfluor 14473 Perfluor	rododecanoic acid1	307-55-1	N.D.	1.8	1
14473 Perfluor	roheptanoic acid¹	375-85-9	1.9	0.88	1
	rohexanesulfonic acid1	355-46-4	N.D.	1.8	1
11170 Darflua	rohexanoic acid¹	307-24-4	2.5	1.8	1
14473 Perfluor	rononanoic acid¹	375-95-1	1.1 J	1.8	1
14473 Perfluor	rooctanesulfonic acid1	1763-23-1	2.8	1.8	1
14473 Perfluor	rooctanoic acid1	335-67-1	5.4	0.88	1
14473 Perfluor	rotetradecanoic acid1	376-06-7	N.D.	0.88	1
14473 Perfluor		72629-94-8	N.D.	0.88	1
14473 Perfluor	rotridecanoic acid1	2058-94-8	N.D.	1.8	1

#### **Sample Comments**

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

#### **Laboratory Sample Analysis Record** Method CAT **Analysis Name** Trial# Batch# **Analysis** Analyst Dilution Date and Time No. Factor EPA 537 Version 1.1 14473 14 PFAS 19156008 06/06/2019 15:19 Jason W Knight Modified EPA 537 Version 1.1 PFAS Water Prep 19156008 06/05/2019 15:15 Isaac Phillips-Cary 1 14091 Modified

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

GW 1069023

2046391

TestAmerica ELLE Sample #:

**ELLE Group #:** 

Matrix: Groundwater

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Sample Description: OC-MP-1#14-XXX Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

Submittal Date/Time: 05/30/2019 10:20 Collection Date/Time: 05/29/2019 09:05

SDG#: TAO18-13

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	MS Miscellaneous EPA 537	Version 1.1	ng/l	ng/l	
14473	NEtFOSAA <sup>1</sup> NEtFOSAA is the acronym for N-ethyl	2991-50-6 perfluorooctanesulfona	N.D. midoacetic Acid.	2.7	1
14473	NMeFOSAA <sup>1</sup> NMeFOSAA is the acronym for N-met	2355-31-9 hyl perfluorooctanesulfo	N.D. onamidoacetic Acid.	2.7	1
14473	Perfluorobutanesulfonic acid1	375-73-5	0.82 J	0.90	1
14473	Perfluorodecanoic acid1	335-76-2	N.D.	1.8	1
14473	Perfluorododecanoic acid1	307-55-1	N.D.	1.8	1
14473	Perfluoroheptanoic acid1	375-85-9	1.5	0.90	1
14473	Perfluorohexanesulfonic acid1	355-46-4	0.47 J	1.8	1
14473	Perfluorohexanoic acid1	307-24-4	2.0	1.8	1
14473	Perfluorononanoic acid1	375-95-1	1.2 J	1.8	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	2.8	1.8	1
14473	Perfluorooctanoic acid1	335-67-1	5.1	0.90	1
14473	Perfluorotetradecanoic acid <sup>1</sup>	376-06-7	N.D.	0.90	1
14473	Perfluorotridecanoic acid1	72629-94-8	N.D.	0.90	1
14473	Perfluoroundecanoic acid <sup>1</sup>	2058-94-8	N.D.	1.8	1

#### **Sample Comments**

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

#### **Laboratory Sample Analysis Record** Method CAT **Analysis Name** Trial# Batch# **Analysis** Analyst Dilution Date and Time No. Factor EPA 537 Version 1.1 14473 14 PFAS 19156008 06/06/2019 15:28 Jason W Knight Modified EPA 537 Version 1.1 PFAS Water Prep 1 19156008 06/05/2019 15:15 Isaac Phillips-Cary 1 14091 Modified

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

GW 1069024

2046391

TestAmerica ELLE Sample #:

**ELLE Group #:** 

Matrix: Groundwater

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Sample Description: OC-MP-1#1-XXX Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

SDG#: TAO18-14

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	/MS Miscellaneous EPA 537	7 Version 1.1	ng/l	ng/l	
14473	NEtFOSAA¹ NEtFOSAA is the acronym for N-ethyl	2991-50-6	N.D. midoacetic Acid.	300	1
14473	NMeFOSAA¹ NMeFOSAA is the acronym for N-met	2355-31-9 hyl perfluorooctanesulfo	N.D. namidoacetic Acid.	300	1
14473	Perfluorobutanesulfonic acid1	375-73-5	N.D.	99	1
14473	Perfluorodecanoic acid1	335-76-2	N.D.	200	1
14473	Perfluorododecanoic acid1	307-55-1	N.D.	200	1
14473	Perfluoroheptanoic acid1	375-85-9	N.D.	99	1
14473	Perfluorohexanesulfonic acid1	355-46-4	N.D.	200	1
14473	Perfluorohexanoic acid1	307-24-4	N.D.	200	1
14473	Perfluorononanoic acid1	375-95-1	N.D.	200	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	N.D.	200	1
14473	Perfluorooctanoic acid1	335-67-1	N.D.	99	1
14473	Perfluorotetradecanoic acid1	376-06-7	N.D.	99	1
14473	Perfluorotridecanoic acid1	72629-94-8	N.D.	99	1
14473	Perfluoroundecanoic acid1	2058-94-8	N.D.	200	1

#### **Sample Comments**

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

#### **Laboratory Sample Analysis Record** Method CAT Trial# Dilution **Analysis Name** Batch# Analysis **Analyst** Date and Time **Factor** 14473 14 PFAS EPA 537 Version 1.1 19156008 06/06/2019 15:37 Jason W Knight Modified 14091 PFAS Water Prep EPA 537 Version 1.1 19156008 06/05/2019 15:15 Isaac Phillips-Cary 1 Modified

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

GW 1069025

2046391

TestAmerica ELLE Sample #:

**ELLE Group #:** 

Matrix: Groundwater

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Sample Description: OC-MP-1#4-XXX Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

SDG#: TAO18-15

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor				
LC/MS	/MS Miscellaneous EPA 537 Ve Modified	rsion 1.1	ng/l	ng/l					
14473	NEtFOSAA <sup>1</sup> NEtFOSAA is the acronym for N-ethyl perfl	2991-50-6 uorooctanesulfonan	N.D. nidoacetic Acid.	2.7	1				
14473	NMeFOSAA <sup>1</sup> NMeFOSAA is the acronym for N-methyl po	2355-31-9 erfluorooctanesulfor	N.D. namidoacetic Acid.	2.7	1				
14473	Perfluorobutanesulfonic acid1	375-73-5	0.42 J	0.90	1				
14473	Perfluorodecanoic acid <sup>1</sup>	335-76-2	N.D.	1.8	1				
14473	Perfluorododecanoic acid1	307-55-1	N.D.	1.8	1				
14473	Perfluoroheptanoic acid <sup>1</sup>	375-85-9	N.D.	0.90	1				
14473	Perfluorohexanesulfonic acid1	355-46-4	0.61 J	1.8	1				
14473	Perfluorohexanoic acid <sup>1</sup>	307-24-4	2.4	1.8	1				
14473	Perfluorononanoic acid1	375-95-1	0.82 J	1.8	1				
14473	Perfluorooctanesulfonic acid1	1763-23-1	4.8	1.8	1				
14473	Perfluorooctanoic acid1	335-67-1	11	0.90	1				
14473	Perfluorotetradecanoic acid <sup>1</sup>	376-06-7	N.D.	0.90	1				
14473	Perfluorotridecanoic acid <sup>1</sup>	72629-94-8	N.D.	0.90	1				
14473	Perfluoroundecanoic acid1	2058-94-8	N.D.	1.8	1				
limits	The sample injection internal standard peak areas were outside of the QC limits for both the initial injection and the re-injection. The values here are from the initial injection of the sample.								

#### Sample Comments

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

#### **Laboratory Sample Analysis Record**

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14473	14 PFAS	EPA 537 Version 1.1 Modified	1	19156008	06/06/2019 15:46	Jason W Knight	1
14091	PFAS Water Prep	EPA 537 Version 1.1 Modified	1	19156008	06/05/2019 15:15	Isaac Phillips-Cary	1

<sup>&</sup>lt;sup>1</sup> = This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

#### **Quality Control Summary**

Client Name: TestAmerica Group Number: 2046391

Reported: 06/12/2019 11:59

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

#### **Method Blank**

Analysis Name	Result	LOQ	
	ng/l	ng/l	
Batch number: 19156008	Sample numb	per(s): 1069020-	1069025
NEtFOSAA	N.D.	3.0	
NMeFOSAA	N.D.	3.0	
Perfluorobutanesulfonic acid	N.D.	1.0	
Perfluorodecanoic acid	N.D.	2.0	
Perfluorododecanoic acid	N.D.	2.0	
Perfluoroheptanoic acid	N.D.	1.0	
Perfluorohexanesulfonic acid	N.D.	2.0	
Perfluorohexanoic acid	N.D.	2.0	
Perfluorononanoic acid	N.D.	2.0	
Perfluorooctanesulfonic acid	N.D.	2.0	
Perfluorooctanoic acid	N.D.	1.0	
Perfluorotetradecanoic acid	N.D.	1.0	
Perfluorotridecanoic acid	N.D.	1.0	
Perfluoroundecanoic acid	N.D.	2.0	

#### LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 19156008	Sample number(	s): 1069020-1	1069025						
NEtFOSAA	5.44	5.59	5.44	5.17	103	95	55-169	8	30
NMeFOSAA	5.44	5.96	5.44	6.02	110	111	44-147	1	30
Perfluorobutanesulfonic acid	4.81	4.82	4.81	5.08	100	106	73-128	5	30
Perfluorodecanoic acid	5.44	6.16	5.44	5.77	113	106	69-148	6	30
Perfluorododecanoic acid	5.44	5.91	5.44	5.85	109	108	75-136	1	30
Perfluoroheptanoic acid	5.44	6.32	5.44	6.82	116	125	76-140	8	30
Perfluorohexanesulfonic acid	5.14	5.78	5.14	5.77	112	112	71-131	0	30
Perfluorohexanoic acid	5.44	6.48	5.44	6.38	119	117	75-135	1	30
Perfluorononanoic acid	5.44	6.37	5.44	6.37	117	117	72-148	0	30
Perfluorooctanesulfonic acid	5.20	4.81	5.20	5.14	93	99	67-138	7	30
Perfluorooctanoic acid	5.44	6.11	5.44	6.05	112	111	72-138	1	30
Perfluorotetradecanoic acid	5.44	5.44	5.44	6.29	100	116	74-135	15	30
Perfluorotridecanoic acid	5.44	5.85	5.44	5.92	108	109	61-145	1	30
Perfluoroundecanoic acid	5.44	5.98	5.44	5.68	110	104	75-146	5	30

<sup>\*-</sup> Outside of specification

<sup>(1)</sup> The result for one or both determinations was less than five times the LOQ.

<sup>(2)</sup> The unspiked result was more than four times the spike added.

#### **Quality Control Summary**

Client Name: TestAmerica Group Number: 2046391 Reported: 06/12/2019 11:59

#### **Labeled Isotope Quality Control**

Labeled isotope recoveries which are outside of the QC window are confirmed unless otherwise noted on the analysis report.

Analysis Name: 14 PFAS Batch number: 19156008

Daton namb	1202 DEDC	120E DELLA	1202 DEU.C	12C4 DEU- A	1200 DEO A	1200 DEOC
	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA	13C8-PFOA	13C8-PFOS
1069020	118	80	97	84	90	82
1069021	124	89	103	91	86	98
1069022	133	80	91	77	84	77
1069023	134	79	90	74	84	85
1069024	85	78	80	81	85	81
1069025	131	70	95	79	85	82
Blank	99	100	97	98	101	99
LCS	102	104	96	101	103	104
LCSD	99	94	91	95	93	91
Limits:	26-148	35-138	34-126	35-126	48-122	50-121
	13C9-PFNA	13C6-PFDA	d3-NMeFOSAA	13C7-PFUnDA	d5-NEtFOSAA	13C2-PFDoDA
1069020	80	89	107	101	104	87
1069021	92	84	90	74	61	84
1069022	75	80	93	81	83	71
1069023	74	89	98	89	87	95
1069024	77	87	85	93	76	86
1069025	74	82	86	85	81	86
Blank	98	102	111	102	118	103
LCS	101	94	117	101	113	105
LCSD	98	99	113	109	124	98
Limits:	41-144	47-125	30-127	30-128	30-142	39-130

	13C2-PFTeDA
1069020	56
1069021	85
1069022	39
1069023	95
1069024	85
1069025	81
Blank	97
LCS	112
LCSD	93
Limits:	26-119

<sup>\*-</sup> Outside of specification

<sup>(1)</sup> The result for one or both determinations was less than five times the LOQ.

<sup>(2)</sup> The unspiked result was more than four times the spike added.

# 1042 2046391 1069020-25



Wood Environment and Infrastructure, Inc. 511 Congress Street Portland, ME 04101 (207) 775-5401 SHIP TO: Lancaster Lab 2425 New Holland Pike Lancaster, PA 17601 Atten: Lynn Frederiksen Lab Phone# (717) 656-2300

#### **CHAIN OF CUSTODY**

DATE: 5/29/2019

COC #: Olin190529A

PAGE: \_\_1\_ OF \_\_1\_

	Project Name: Project Number:	Olin Wilmington	Project Contact: Phone Number.			ningham		lazzolini s = (339) 9:	27.3706		Bill To	: TestA	merica				isposal Ins			AB EDEX	
	Project Manager:	Libby Bowen	Project Phase:		.001.07	3, <del>,                                  </del>	04 O/11/	3 (000) 0	., 0,00		Relea	sa Order i	oust be not	ed on all in	valces	ECONORIGINATION AND	aybill Nun			/A	
31400						T			000000000000000000000000000000000000000	100-000-000-0							and the state of t	15.51.			
S	mple Information										Metho	ds for An	alysis		<del></del>				RUS	Н	
No	1 OC-GW-10DR-XXX	Date & Time Sampled 05/29/19 14:20	Matrix GW	Sample Type N	Z MS/MSD	PFAS (537) Lancaster (2) 250nL HDPE												X STD (2-Week)			N TOTAL BOTTLES HOLD All Analyses
	2 OC-GW-305-XXX	05/29/19 10:14	GW	N	N	X												X			2
	3 OC-GW-307-XXX	05/29/19 13:18	GW	N	Ν	X												X			2
-	4 OC-MP-1 #14-XXX	05/29/19 09:05	GW	N	N	X												X			2
-	OC-MP-1 #1-XXX	05/29/19 11:30	GW	N	N	×												X			2
L	6 OC-MP-1 #4XXX	05/29/19 10:20	GW	N	N	×												X			2
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Re	mpler's Signature: Uyaluth penta Ilinglished By/Affiliation: Ulyaluth penta Ceivell By:	Elizabeth Penta	05/29/2019 Date: 05/29/2019 Date:	16:00 Time: 16:00		Does COC match samples: Broken Container: COC seal intact: Other problems:					•	Y or N Y or N	Co	Comments: X=Analyze H=Hold Analysis Request							
1	FedEx		05/29/2019	16:30			contacted	i:					Y or N		ease Se			for inv	oicing	3	
L	linquished By/Affiliation:		Date:	Time:		Date cor	ntacted:					3,	2		AL Projec						1
	celved By:		Date:	Time:		Cooler T	emperatu	re at receip	t:			- >,	5 %	- 1 1	JMBER O	F COOLE	RS SENT:			1	
L	linquished By/Affiliation: ceived By (LAB):	m	Date: 5/30//	Time:	<u>.</u> e							Delive	rables: Le	vel 2, Lev	vel 4 and	I EQUIS I	EZ EDD				



# Sample Administration Receipt Documentation Log

Doc Log ID: 250260

Group Number(s): 2046391

Client: Wood Environmental and Infrastructure

**Delivery and Receipt Information** 

Delivery Method: Fed Ex Arrival Timestamp: 05/30/2019 10:20

Number of Packages: 1 Number of Projects: 1

State/Province of Origin: ME

**Arrival Condition Summary** 

Shipping Container Sealed: Yes Sample IDs on COC match Containers: Yes

Custody Seal Present: Yes Sample Date/Times match COC: Yes

Custody Seal Intact: Yes VOA Vial Headspace ≥ 6mm: N/A

Samples Chilled: Yes Total Trip Blank Qty: 0

Paperwork Enclosed: Yes Air Quality Samples Present: No

Samples Intact: Yes

Missing Samples: No

Extra Samples: No

Discrepancy in Container Qty on COC: No

Unpacked by Simon Nies (25112) at 15:57 on 05/30/2019

**Samples Chilled Details** 

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

 Cooler #
 Thermometer ID
 Corrected Temp
 Therm. Type
 Ice Type
 Ice Present?
 Ice Container
 Elevated Temp?

 1
 DT42-03
 3.3
 DT
 Wet
 Y
 Bagged
 N



**BMQL** 

ppb

basis

Dry weight

### **Explanation of Symbols and Abbreviations**

milliliter(s)

The following defines common symbols and abbreviations used in reporting technical data:

Below Minimum Quantitation Level

			` '
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IU	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm	aqueous liquids, ppm is usually take	n to be equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weight juivalent to one microliter per liter of gas.

mL

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Results printed under this heading have been adjusted for moisture content. This increases the analyte weight

concentration to approximate the value present in a similar sample without moisture. All other results are reported on an

Measurement uncertainty values, as applicable, are available upon request.

parts per billion

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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# **Data Qualifiers**

Qualifier	Definition
С	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
Р	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised
	due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.









#### **ANALYSIS REPORT**

Prepared by:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 Prepared for:

TestAmerica 501 Southampton Road Suite C Westfield MA 01085

Report Date: July 19, 2019 12:46

**Project: Olin Wilmington** 

Account #: 01042 Group Number: 2052690 SDG: TAO20 PO Number: 48006612 State of Sample Origin: MA

Electronic Copy To	Olin Chemicals	Attn: James Cashwell
Electronic Copy To	Olin Corporation	Attn: Chinny Esakkiperumal
Electronic Copy To	Wood PLC	Attn: Binks Colby-George
Electronic Copy To	Wood PLC	Attn: Tige Cunningham
Electronic Copy To	Wood PLC	Attn: Chris Ricardi
Electronic Copy To	Wood PLC	Attn: Karen Savage
Electronic Copy To	Wood PLC	Attn: Peter Thompson
Electronic Copy To	Wood PLC	Attn: Chris Mazzolini
Electronic Copy To	Wood	Attn: Elizabeth Penta
Electronic Copy To	Wood PLC	Attn: Libby Bowen

Respectfully Submitted,

Lynn M. Frederiksen

Principal Specialist Group Leader

Lyn M. Frederiksen

(717) 556-7255

To view our laboratory's current scopes of accreditation please go to <a href="https://www.eurofinsus.com/environment-testing/laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/">https://www.eurofinsus.com/environmental-testing/laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/</a>. Historical copies may be requested through your project manager.









#### **SAMPLE INFORMATION**

**Client Sample Description** 

Sample Collection
Date/Time

ELLE#

OC-MP-1#1-XXX Groundwater

05/29/2019 11:30

1097483

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



#### Lancaster Laboratories Environmental







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#### **MADEP MCP Analytical Method Report Certification Form**

Laboratory Name: Eurofins Lancaster Laboratories Environmental

Project: Olin Wilmington

This form provides certifications for the following data set: Sample number(s): 1097483

Sample Matrices: Water

Methods Used:

EPA 537 Version 1.1 Modified

Affii	rmative responses to questions A through F are required for "Presumptive Certainty" status	Yes or No <sup>1</sup>
Α	Were all samples received in a condition consistent with those described on the Chain-of-	NI-
	Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	No
В	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	Yes
O	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	Yes
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A,	
	"Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of	Yes
	Analytical Data"?	
Е	VPH, EPH, APH, and TO-15 only:	
	a. VPH, EPH, and APH Methods only: Was each method conducted without significant	NA
	modification(s)? (Refer to the individual method(s) for a list of significant modifications).	
	b. APH and TO-15 Methods only. Was the complete analyte list reported for each method?	NA
F	Were all applicable CAM protocol QC and performance standard non-conformances identified	Yes
	and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	163
Res	ponses to Questions G, H and I below are required for "Presumptive Certainty" status	
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM	No
	protocol(s)?	140
	Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usar	bility
	and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.	
Н	Were all QC performance standards specified in the CAM protocol(s) achieved?	Yes
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	Yes
<sup>1</sup> Re	efer to the Case Narrative for information regarding negative responses.	
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I, the undersigned, attest under the pains and penalties of perjury that the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Kenneth Boley

Senior Specialist, Quality Assurance



### Case Narrative

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Project Name: Olin Wilmington ELLE Group #: 2052690

#### **General Comments:**

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.

Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

#### **Analysis Specific Comments:**

#### EPA 537 Version 1.1 Modified, LC/MS/MS Miscellaneous

Sample #s: 1097483

Reporting limits were raised due to interference from the sample matrix.

The holding time was not met. Per client request, this sample was extracted outside of the method holding time.



GW 1097483

2052690

TestAmerica ELLE Sample #:

**ELLE Group #:** 

Matrix: Groundwater

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Sample Description: OC-MP-1#1-XXX Groundwater

**Olin Wilmington** 

Project Name: Olin Wilmington

SDG#: TAO20-01

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation	Dilution Factor
LC/MS	/MS Miscellaneous EPA 537 Modified	Version 1.1	ng/l	ng/l	
14473	NEtFOSAA <sup>1</sup> NEtFOSAA is the acronym for N-ethyl	2991-50-6 perfluorooctanesulfona	N.D. midoacetic Acid.	75	1
14473	NMeFOSAA <sup>1</sup> NMeFOSAA is the acronym for N-meth	2355-31-9 nyl perfluorooctanesulfo	N.D. namidoacetic Acid.	75	1
14473	Perfluorobutanesulfonic acid1	375-73-5	N.D.	25	1
14473	Perfluorodecanoic acid1	335-76-2	N.D.	50	1
14473	Perfluorododecanoic acid1	307-55-1	N.D.	50	1
14473	Perfluoroheptanoic acid1	375-85-9	N.D.	25	1
14473	Perfluorohexanesulfonic acid1	355-46-4	N.D.	50	1
14473	Perfluorohexanoic acid1	307-24-4	N.D.	50	1
14473	Perfluorononanoic acid1	375-95-1	N.D.	50	1
14473	Perfluorooctanesulfonic acid1	1763-23-1	N.D.	50	1
14473	Perfluorooctanoic acid1	335-67-1	N.D.	25	1
14473	Perfluorotetradecanoic acid1	376-06-7	N.D.	25	1
14473	Perfluorotridecanoic acid1	72629-94-8	N.D.	25	1
14473	Perfluoroundecanoic acid1	2058-94-8	N.D.	50	1
Repo	rting limits were raised due to interference	ce from the sample mate	rix.		

The holding time was not met. Per client request, this sample was extracted outside of the method holding time.

#### **Sample Comments**

State of Massachusetts Laboratory Non-Potable Water Certification M-PA009

This sample was originally received on 5/30/19 at 10:20; we received a request for a re-extraction from R. Morris of Olin on 6/21/19.

#### **Laboratory Sample Analysis Record** Method CAT Trial# Batch# Analysis **Analyst** Dilution **Analysis Name** Date and Time No. **Factor** 14473 14 PFAS EPA 537 Version 1.1 19171009 06/22/2019 21:18 Danielle D McCully Modified 14091 PFAS Water Prep EPA 537 Version 1.1 19171009 06/20/2019 15:45 Isaac Phillips-Cary Modified

<sup>1 =</sup> This analyte was not on the laboratory's MA DEP Scope of Accreditation at the time of analysis.

#### **Quality Control Summary**

Client Name: TestAmerica Group Number: 2052690

Reported: 07/19/2019 12:46

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

#### **Method Blank**

Analysis Name	Result	LOQ
	ng/l	ng/l
Batch number: 19171009	Sample num	ber(s): 1097483
NEtFOSAA	N.D.	3.0
NMeFOSAA	N.D.	3.0
Perfluorobutanesulfonic acid	N.D.	1.0
Perfluorodecanoic acid	N.D.	2.0
Perfluorododecanoic acid	N.D.	2.0
Perfluoroheptanoic acid	N.D.	1.0
Perfluorohexanesulfonic acid	N.D.	2.0
Perfluorohexanoic acid	N.D.	2.0
Perfluorononanoic acid	N.D.	2.0
Perfluorooctanesulfonic acid	0.40 J	2.0
Perfluorooctanoic acid	N.D.	1.0
Perfluorotetradecanoic acid	N.D.	1.0
Perfluorotridecanoic acid	N.D.	1.0
Perfluoroundecanoic acid	N.D.	2.0

#### LCS/LCSD

Analysis Name	LCS Spike Added ng/l	LCS Conc ng/l	LCSD Spike Added ng/l	LCSD Conc ng/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 19171009	Sample number(	s): 1097483							
NEtFOSAA	5.44	5.98	5.44	6.77	110	124	55-169	12	30
NMeFOSAA	5.44	5.54	5.44	5.71	102	105	44-147	3	30
Perfluorobutanesulfonic acid	4.81	4.49	4.81	4.54	93	94	73-128	1	30
Perfluorodecanoic acid	5.44	5.42	5.44	5.12	100	94	69-148	6	30
Perfluorododecanoic acid	5.44	5.59	5.44	5.34	103	98	75-136	5	30
Perfluoroheptanoic acid	5.44	5.50	5.44	5.78	101	106	76-140	5	30
Perfluorohexanesulfonic acid	5.14	4.67	5.14	4.80	91	93	71-131	3	30
Perfluorohexanoic acid	5.44	5.26	5.44	5.53	97	102	75-135	5	30
Perfluorononanoic acid	5.44	5.10	5.44	4.90	94	90	72-148	4	30
Perfluorooctanesulfonic acid	5.20	4.81	5.20	4.78	92	92	67-138	1	30
Perfluorooctanoic acid	5.44	5.34	5.44	5.29	98	97	72-138	1	30
Perfluorotetradecanoic acid	5.44	5.64	5.44	5.01	104	92	74-135	12	30
Perfluorotridecanoic acid	5.44	6.02	5.44	5.24	111	96	61-145	14	30
Perfluoroundecanoic acid	5.44	5.67	5.44	5.89	104	108	75-146	4	30

<sup>\*-</sup> Outside of specification

<sup>(1)</sup> The result for one or both determinations was less than five times the LOQ.

<sup>(2)</sup> The unspiked result was more than four times the spike added.

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### **Quality Control Summary**

Client Name: TestAmerica Group Number: 2052690

Reported: 07/19/2019 12:46

#### **Labeled Isotope Quality Control**

Labeled isotope recoveries which are outside of the QC window are confirmed unless otherwise noted on the analysis report.

Analysis Name: 14 PFAS Batch number: 19171009

	13C3-PFBS	13C5-PFHxA	13C3-PFHxS	13C4-PFHpA	13C8-PFOA	13C8-PFOS
1097483	86	89	99	91	89	77
Blank	79	77	80	79	79	80
LCS	77	88	89	84	88	82
LCSD	75	74	74	72	72	72
Limits:	26-148	35-138	34-126	35-126	48-122	50-121
	13C9-PFNA	13C6-PFDA	d3-NMeFOSAA	13C7-PFUnDA	d5-NEtFOSAA	13C2-PFDoDA
1097483	73	73	66	80	71	81
Blank	83	74	89	80	81	76
LCS	91	82	89	93	85	78
LCSD	79	78	71	76	77	76
Limits:	41-144	47-125	30-127	30-128	30-142	39-130

	13C2-PFTeDA	
1097483	87	_
Blank	78	
LCS	78	
LCSD	80	

Limits: 26-119

<sup>\*-</sup> Outside of specification

<sup>(1)</sup> The result for one or both determinations was less than five times the LOQ.

<sup>(2)</sup> The unspiked result was more than four times the spike added.

2052690 / 1097483 1042 | 2046391 | 1069020-25 @mzzy

wood.

Wood Environment and Infrastructure, Inc. 511 Congress Street Portland, ME 04101 (207) 775-5401 SHIP TO: Lancaster Lab 2425 New Holland Pike Lancaster, PA 17601 Atten: Lynn Frederiksen

**CHAIN OF CUSTODY** 

DATE: 5/29/2019

COC #: Olin190529A

PAGE: 1 OF 1

	(201) 110-0401			Lab Phor			)											PAGE:	<del>''</del> '	JF
Project Name:	Olin Wilmington	Project Contact						1			Вііі То;	TestAme	erica			Dis	posal insi	ructions;	LAB	g de la
Project Number,	6107190016	Phone Number.		Tige = (2	07) 329-0	164 CF	iris = (33	9) 927-	3796								pment Me		FEDI	ŧx
Project Manager.	Libby Bowen	Project Phase:		.001,07							Release	Order must	be noted a	on all inv	ices	Wa	ybili Num	oer.	N/A	
Sample Information				,	_	7	7	,		N	lethods	for Analys	ls		·	<del></del>			RUSH	
				Q	PFAS (537) Lancaster (2) 250mL HDPE	Repeat w/ 10ML aliquesta	fuer R. Marris	LE, 6/2	HS43 7/10/19									STD, Z.Week)		TOTAL BOTTLES
				MS/MSD	15 (3	3							1					(Z-N		A B
No. Sample ID	Date & Time Sampled	Matrix	Sample Type	MS	F 6	er 9	-4 (9	)Q)												þ
1 OC-GW-10DR-XXX	05/29/19 14:20	GW	N	7	X													X		2
2 OC-GW-305-XXX	05/29/19 10:14	GW	N	2	X													x	11	2
3 OC-GW-307-XXX	05/29/19 13:18	GW	2	Ν	X													x		2
4 OC-MP-1 #14-XXX	05/29/19 09:05	GW	N	Ν	X													x		2
5 OC-MP-1 #1-XXX	05/29/19 11:30	GW	N	N	X	X												X		2
6 OC-MP-1 #4XXX	05/29/19 10:20	GW	N	·N	X													x		2
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Sampler's Signature: Luyalut h penta	Elizabeth Penta	05/29/2019	16:00			OC matcl		s:				(Y)	or N	Con	ments:					
Relinguished By/Affiliation:	wood	Date: 05/29/2019	Time: 16:00		COC se	Broken Container: Y or N COC seal intact: Y or N					X=Anal	yze H=	Hold A	nalysis	Reque	st				
Received By: FedEx		Date: 05/29/2019	Time: 16:30		Other problems: Y or (b)															
Relinquished By/Attiliation:		Date:	Time:		WSDOT contacted: Y or N Date contacted: Y or N TAL Project # = 4800661:					tor invo	icing									
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Relinquished By/Affiliation:		Date:	Time:	•							t	Deliverable	es: Level						<u>-</u>	
Received By (LAB):	m	Date: 5/30//	Time: /07	e																



#### Sample Administration Receipt Documentation Log

Doc Log ID: 250260

Group Number(s): 2052690

Wood Environmental and Infrastructure Client:

**Delivery and Receipt Information** 

Delivery Method: Fed Ex Arrival Timestamp: 05/30/2019 10:20

Number of Packages: Number of Projects: <u>1</u> <u>1</u>

State/Province of Origin: ME

**Arrival Condition Summary** 

Shipping Container Sealed: Yes Sample IDs on COC match Containers: Yes

**Custody Seal Present:** Yes Sample Date/Times match COC: Yes

**Custody Seal Intact:** Yes VOA Vial Headspace ≥ 6mm: N/A

0 Samples Chilled: Yes Total Trip Blank Qty:

Air Quality Samples Present: No Paperwork Enclosed: Yes

Samples Intact: Yes

Missing Samples: No

Extra Samples: No

Discrepancy in Container Qty on COC: No

Unpacked by Simon Nies (25112) at 15:57 on 05/30/2019

**Samples Chilled Details** 

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler# Thermometer ID Corrected Temp Therm. Type Ice Type Ice Present? Ice Container **Elevated Temp?** DT42-03 DT Wet Ν 1 3.3 Bagged



**BMQL** 

ppb

basis

Dry weight

parts per billion

as-received basis.

# **Explanation of Symbols and Abbreviations**

milliliter(s)

The following defines common symbols and abbreviations used in reporting technical data:

Below Minimum Quantitation Level

С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IU	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm	aqueous liquids, ppm is usually taken	to be equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weight uivalent to one microliter per liter of gas.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Results printed under this heading have been adjusted for moisture content. This increases the analyte weight

concentration to approximate the value present in a similar sample without moisture. All other results are reported on an

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.



# **Data Qualifiers**

Qualifier	Definition
С	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
Р	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised
	due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.